The Circular Economy

Dame Ellen MacArthur

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What resonates for me personally around the idea of Harmony is the fact that it addresses the whole system. As I grew up and went through education, everything I seemed to learn was in silos; it was in columns. It was about one subject there, and one subject here. I think what's so powerful with the Harmony principles is that they reconnect everything. And everything is indeed connected, as it is in nature. Everything in business is connected, every resource that we take from the ground is connected, and every insect is connected with every piece of soil. Yet it's so easy to slip into that mindset that everything is separate, and we tackle things separately.

I believe the only way that we're able to face, and indeed solve, the world's challenges is to look at the world as a system, as a whole, and to look at how those connected elements can really resonate. Nature depends on cycles. It always has. If there's one message that's central to the circular economy, it's that life itself has existed for billions of years. Life itself never created waste; everything was regenerated. But what we've created now is a system which is extractive and consumptive, not restorative and regenerative. The message behind the circular economy is in parallel with Harmony in that you need to build a restorative and regenerative system from the beginning. That involves us all through the education of young people, and right through to the chief executives running the biggest companies in the world.

My journey to this point, right now, to understanding the principles of the circular economy, began with a boat. You may or may not be aware that my history was racing. My goal from the age of four was to sail around the world. I had no idea how I would achieve that, but that was absolutely my goal. I was lucky enough to sail around the world solo twice, once in a race in 2000 called Vendée Globe, and the second time in 2004. And it was quite an interesting insight for me into how systems function. When you set off on one of these boats around the world, you enter a different space, a different mindset. You behave in a different way, you're incredibly stressed, you're full of adrenaline, and you're

managing this tiny world, which is your cocoon that keeps you alive. These boats are pretty exciting. It's not a gentle sail in the sunshine, waving at people on the beaches. You generally don't see land when you sail around the world. And boats can go wrong very quickly. I know this very well because I was one of the five crew members on a boat which flipped upside down, literally in five seconds.

Now, that could happen at any time when you're sailing around the world. It could happen when you're in the Southern Ocean, two and a half thousand miles away from the nearest town and if it does then you probably won't make it: if help can get to you, it takes five days, and then five days for that ship to get you back, and to a hospital. You really are isolated, and you really do understand that what you have with you on that boat is all you have, there is no more. It was that understanding that I developed from sailing, that fundamental understanding of what finite truly means. That on that boat, what you have is all you have. There are no more resources, you're two and a half thousand miles to the nearest shop. That led me to look at the economy in a different way.

On the boat you live in a different world, you perceive what's around you in a different way, and I couldn't get that out of my head when I finished that voyage. I couldn't stop thinking about it: it was like a tiny little spark under a rock. You know, a large part of me wanted to put that rock back down and carry on with my dream job of racing around the world, but I couldn't. I couldn't do it. I had to put that rock to one side, and learn more about resources, energy and how the economy functions. We too have finite resources available to us as humanity. About eight years ago I started to learn. I started to study. I went to a coal-fired power station: it's still incredibly important and it was a subject very close to my family because my great grandfather was a coal miner. We were really close. He used to tell me his mining stories from when he worked deep underground with ponies to pull the coal out from the coal face. He was alive until I was eleven years old. This is really not that long ago. Yet, when I went on this journey of learning to try and understand the resources that we have available to us, one of the places I went to was the World Coal Association, and there, in the middle of the homepage, it said, 'We're not about to run out of coal, we've got about 118 years left'.

I did the maths, and I realised that my great grandfather had been born exactly a hundred and eighteen years previously. Then you realise it's no time at all. A hundred and eighteen years is nothing in the broad sweep of history, and it made me make the decision I never, ever thought I would make: to completely leave the sport of sailing and focus on global economics. To understand what success can look like for us, for the global economy, for farming, for children,

for everything. Because the way the economy functions at the moment uses up natural resources, as I did on my boat. In contrast to sailing though we cannot re-stock the planet's resources as we can re-stock at the end of a voyage. We know that natural materials are finite – we have them once, and we're using them up at a faster and faster rate. You can define that as a linear economy: one that takes material out of the ground, makes something out of it, and then ultimately, the majority of it gets thrown away. We're able to get some of the material back, but we have a conveyor belt, exactly as farming has moved from being regenerative, even just a hundred years ago, to now, run on the extractive and consumptive principles of a linear economy, and that's worked quite well for a while. Now, we have a growing population, we have more and more pressure on resources, and we know the inputs are finite. As a long-term plan, it simply cannot work. Is there a different way of doing things? To replace the extractive and consumptive principles of a linear economy with a system which is restorative and regenerative?

As I went on my own journey, trying to understand what success could look like, what fascinated me were other ideas: life itself, which has existed for billions of years, has always been regenerative. Is there a way we could shift so that the linear becomes circular, taking ideas such as biomimicry, cradle-to-cradle design, industrial symbiosis, the performance economy, the sharing economy?

When we approach anything that we do within our economy, we do that in a circular way. We look at life itself, the fact that life itself has never had waste of the type that we create now. What if you apply that to the global economy? Not just the materials, such as the biodegradable materials – human waste, farm waste, agricultural waste and food production waste. Not just those materials that cycle, as they have, arguably, for billions of years, but also technical materials, that really will never biodegrade. What if metals, plastics and other polymers were also designed to fit within a cycle? At the beginning, at the design stage, we will design products so that we can get the materials back again. Better still, we will design a product so it can be re-manufactured, so we can collect the materials and re-use them easily, enhancing their value. Actually, the last loop is recycling, feeding materials back into the economy. And we can work with renewable energy, and reduce energy demand by 80%, if we re-manufacture something rather than melt it down or start from scratch: 80% less material, 80% less energy.

When we created the Ellen MacArthur Foundation seven years ago, our goal was to accelerate the transition to this circular economy, working with young people, which is absolutely vital: they see the world, from the beginning, in a circular way. [1] Also, working with businesses that know the linear system can't run in the long-term, working on analysis and insight, looking at the numbers,

and asking what does the circular economy mean for the global economy? Does it make more money, or is it expensive? Every single report we've done to date has shown there is a sound economic rationale for shifting from linear to circular. It makes more money. The most hard-nosed businesswomen get this because if they can become circular, they will unlock more value for their company. This is the most important driver, so far, of the circular economy, because although we know the idea makes common sense, if there is economic value to be had, employment to be had, growth of countries to be had, through decoupling growth from resource constraints, then it will happen much more quickly.

There is a great crossover between the circular economy and the Harmony principles which stress that everything is connected: it is about strength and diversity. Diversity comes from the different sizes, types, and locations of companies. And there is strength in that diversity, which we should embrace and understand. In addition, the fact that nature itself depends on cycles, well, that is at the heart of the circular economy.

What are examples of what a circular economy could look like? First, anything biodegradable - that could include a cotton T-shirt, this lectern, agricultural waste, farming waste, food production waste, ourselves even – could re-enter the natural systems that support food and farming, or be used in other industries. A piece of timber might be turned into chipboard, and then into particle board. Then, maybe, at the end of the life of that particle board, if it's designed correctly, it could be bio-digested and turned into fertiliser, heat and biogas. How many times can you use that resource before it gets to the end of its period of use, before it re-enters the biological cycle? Then we have what we call technical materials: metals, plastics, other polymers, and so on. These may not be biodegradable, but we can also look at them through that same lens of circularity, asking 'What if they were designed so that we could keep them at their highest value at all times?' Whether it is a car, a plane, a chair or a phone, we could design it so that at the end of its use, it comes back and the components and materials are reused. Then you've built a restorative, regenerative system.

Even Apple, now, has a tariff in the US where you get a new phone every year. You think, 'Well, what's circular about that?' The moment you go on this tariff, they own the phone, so at the end of the year, they get the phone back. They know everything that's in that phone: they may resell it, they may remanufacture it, or they may recycle the materials and put them in the next phone. That phone no longer stays in our drawer at home when we don't know what to do with it. It feeds back into a system.

To return to biological material – sorry, food waste: in every tonne of food

waste, there's $6 of fertiliser, $18 of heat and $26 of electricity.[2] How much of that is fed back into that system from our cities, from our towns? Even from our villages? This is a massive resource: not just food waste, but human waste and agricultural waste. In fact, we did a study asking whether, if we could collect all this together, globally, could we actually replace current chemical fertiliser use? The answer was yes by 2.7 times.[3] Now, we're a long way from that, but it shows the potential of looking at the materials we have available to us, in a regenerative and restorative way.

You look at the aggregate nutrients from cities, materials in landfill sites: if they were all designed correctly, none of them would be waste. We lose between 80 and 120 billion US dollars' worth of plastic packaging every single year because we don't design it, or the systems to recover it, so that it can be valorised.[4] Then we need to consider different ideas for packaging to replace plastic. We now are able to manufacture biodegradable packaging from mycelium, mould and corn husks, on price parity with Styrofoam, which it's designed to replace. And if we can produce alternatives to plastic, then we can do the same for fabrics. One company based in Switzerland makes fabrics that you could actually eat if you wanted, and are used in airplanes, so the air quality is better because they're not full of toxins.

The economic reports that the Foundation issues are absolutely vital in our understanding of a circular economy. We try to understand the numbers in the connected way that both Harmony and the circular economy approach recognise, looking at the entire system. In 2015 we completed a report looking at how we could become more circular from the perspectives of the built environment, mobility and food systems.[5] To include the digital revolution as the Prince of Wales mentioned, we found the figures to be absolutely fascinating. For example, if we harness that digital revolution in Europe, within those three sectors – the built environment, mobility and food systems – we would save 32% of primary materials by 2030 and 53% by 2050. Reduction in CO_2 emissions would be 48% by 2030 and 83% by 2050. And there would be an 80% decrease in chemical fertiliser use by 2050. We really do see significant momentum in putting all this into practice. We have companies all over the world embracing this and understanding how they can become circular. We are working within education, with universities all over the world, with lecturers, understanding their teaching and learning in relation to the circular economy and supporting the research that has to happen to understand it in more detail.

I'd like to finish with cities, which are huge aggregators of both technical and biological materials. We need to look at how cities can be transformative

agents to help food and farming systems. More and more people live in cities. Food comes into cities from the countryside, but how do we get the waste to be something of great value and feed it back into that food and farming system, to echo the natural cycles that have existed for billions of years? In the area of food and farming, we can build a system that actually regenerates the land. It doesn't slow down the demise, as we have talked about so often. It actually rebuilds natural capital, faster and faster. When we work with young people, they get this immediately, and they want to build a better system; it's incredibly inspiring.

Just finally, is this possible? Well, to shift the entire global economy from linear to circular is quite a big task. But if we look at what can happen in a lifetime, we can see that anything, really, is possible. When my great grandfather was born in 1894, there were twenty-five cars on the road in the entire world. Twenty-five! That's it. When he was thirteen years old, we built the first aeroplane. Now, three times the population of the world back then fly every single year. When he was forty, we built the first computer, and many said it wouldn't catch on, but we turned that into a microchip within just twenty years.

Ten years before my great grandfather died, the mobile phone arrived. It definitely wasn't a smartphone, but it changed infrastructure across the entire world, including in emerging markets. It showed there was a different way of developing, and we believe the circular economy provides a different model of development for emerging markets. As my great grandfather left this earth, the internet arrived. If ever there was a time when we can change the global economy, it's right now. We can share an idea from Wales to the rest of the world in seconds!

NOTES

1. Ellen MacArthur Foundation, https://www.ellenmacarthurfoundation.org/ (Accessed 14 September 2019)

2. Ellen MacArthur Foundation, Towards the Circular Economy Vol. 2: opportunities for the consumer goods sector' (2013). For more information see Ellen MacArthur Foundation, 'Food Initiative', https://www.ellenmacarthurfoundation.org/our-work/activities/food (Accessed 14 September 2019).

3. Ellen MacArthur Foundation, 'Urban Biocycles' (2017), https://www.ellenmacarthurfoundation.org/publications/urban-biocyles (Accessed 29 October 2019).

4. Ellen MacArthur Foundation, 'The New Plastics Economy: Rethinking the future of plastics' (2016). For more information see https://www.ellenmacarthurfoundation.org/our-work/activities/new-plastics-economy (Accessed 14 September 2019).

5. Ellen MacArthur Foundation, Stiftungsfonds für Umweltökonomie und Nachhaltigkeit (SUN) and McKinsey Center for Business and Environment, 'Growth Within: A Circular Economy Vision for a Competitive Europe' (2015).