

Kuituus Podcast

Jakso/Episode 12: Textile recycling in Turkey

[äänite alkaa/recording begins]

Intro [00:00:01]: Aalto yliopiston podcast.

[music 00:00:02]

Sini Suomalainen [00:00:05]: Suomessa syntyy 100 000 tonnia poistotekstiiliä vuodessa. Sen erilliskeräys alkaa vuonna 2023. Nyt etsimme sille käyttökohteita. Minä olen Sini Suomalainen, Kuituus hankkeen vetäjä. Tutustu aiheeseen kuituus.aalto.fi.

[music 00:00:19]

Intro [00:00:21]: Poistotekstiilistä tuotteeksi. Kuituus podcast.

[music 00:00:24]

Sini Suomalainen [00:00:26]: Kuituus podcast goes international this week, as we have a really interesting theme and researcher visiting us. Welcome, Tulin.

Tulin Dzhengiz [00:00:37]: Hi, Sini. It is good to be here. It is good to be talking to you.

Sini Suomalainen [00:00:40]: Excellent. Tulin works for FINIX project at Aalto university. And she has been doing research on textile recycling in Turkey. The thing why this seems super interesting is that actually textile recycling has been working quite well in Turkey for decades or even centuries. How is it, Tulin?

Tulin Dzhengiz [00:01:03]: Yes, decades. You can definitely say decades.

Sini Suomalainen [00:01:07]: Yeah. And now we are trying and trying to start it in Finland and Sweden and Holland everywhere here. And how come we cannot do it, but in Turkey it works so well? That is what we are going to find out today with Tulin. Okay. Who are you, Tulin? Could you present yourself a bit?

Tulin Dzhengiz [00:01:27]: Yeah. So, I am, by background, a chemical and industrial engineer. But I have moved towards business and management studies later on. I am originally Turkish. Thus the research interest in Turkey. I did a PhD in business and management in Alliance Manchester business school in the U.K. And in my PhD, I studied various forms of collaborations that... Actually, electricity industry, electric utilities built to address sustainability challenges. So, it is fair to say that my main research area is sustainability of businesses. And broadly the question of how can we transform businesses and business ecosystems towards the sustainable development agenda.

Sini Suomalainen [00:02:22]: What made you interested in textile recycling?

Tulin Dzhengiz [00:02:25]: The idea of circularity after doing research on sustainability. It was quite a natural transition for me as a research area. So, I found it very important area that needs to be studied further. And then textiles industry. Both, sustainability issues and circularity issues are only in the last five, six years

maybe becoming very popular research topic in the research domain, but also in the industry. So, there is this increasing awareness on circularity. So, now if you join industry events, literally everyone is talking about circular fashion, et cetera. But that really was not the case 10 years ago or six years ago. So, of course, this was also very interesting, studying something so relevant and so important for a whole region. Because I am completely aware that in Europe right now this is also policy-wise, it's a regional priority.

Sini Suomalainen [00:03:32]: Are you familiar with any other countries' textile recycling than Finland and Turkey?

Tulin Dzhengiz [00:03:38]: Yeah. So, textile recycling is kind of... It is fair to say that actually when it starts in these countries, it starts not because these countries have been resource rich, but because they may be resource poor. So, if they already have an existing textile industry, so, for instance, like Italy and Spain, then it is very natural that they develop a recycling industry as well. Because naturally, if you are producing textiles or fabrics, you are going to have a load of pre-consumer waste. And either traditionally you have to burn them, or you have to get rid of them. You cannot keep storing them. So, in these kinds of countries where textiles was a big part of the industrial kind of network, then they had to invest in recycling. And in Italy for instance, there is this region, Prato region, so it is quite famous already. In Spain also, there is textile... Definitely there are many textile recycling actors. And in Turkey, it is kind of like resembling Italy and Spain in that sense. And in fact, in Turkey, when it started, it also started... But some of the informants that I had spoken to, they share stories of how their grandparents or parents visited Italy and actually bought machines, textile recycling mechanical recycling machines, from Italy, and brought them to Turkey. And they started operating in that way. So, it is kind of like a resemblance in that sense.

Sini Suomalainen [00:05:37]: What was your research question when you started this?

Tulin Dzhengiz [00:05:42]: Well, first of all, I was really motivated to do some research in Turkey because I have the feeling that when we study in Europe, there are many people for instance in Finland that can study the Finnish textile ecosystem and what is happening there. And they can do that in Finnish. [chuckles 00:06:04] But then, what we lack knowledge on is countries like Turkey. So, more the emerging country context. What is happening there and how are dynamics different there. How industry players operate in completely different business context there, whether it be the policy and policy-related support and whether it be the kind of relationships between them. Because things may be very formal in Finland for instance, but they are not that formal in Turkey. So, a lot of things still built on informal relationships and dynamics. So, I was curious how those things had affected in Turkey the recycling ecosystem. And I was also generally curious because I had read several reports. These were drafted by some really great NGOs who focused on this particular industrial district in an area. And I was really curious to visit this area and see how it actually worked out. And so, that was the motivation. It was a bit exploring this ecosystem. So, hundreds of recyclers. So, it is also a place where you can observe, not just one or two companies, but hundreds of companies in one particular location where you see tons of waste in trucks loaded, coming into the city and leaving the city as fibre. So, as an idea, it was quite interesting and motivating. So, that was the beginning. So, that was how I travelled to Turkey to do the research.

Sini Suomalainen [00:07:55]: Are you able to compare the system in Turkey to the one in Finland? Or what we are aiming at in Finland?

Tulin Dzhengiz [00:08:02]: Yeah. So, I think I can make some comparisons. So, maybe we can talk about some more general bullet points in that. So, one thing is in Finland, the organisation is through various networks, like the Telaketju network and now the FINIX network as well. So, there are various collaborative networks or ecosystems, if you will. And the government is involved. So, there is the state involvement. And academia is involved at the same time. So, you see a lot of

academics discussing things with the industry actors, et cetera. So, when you look at the organisation of the Turkish recycling work, generally you do not see that. So, generally, what you see is that there is more of an informal dynamic. There is no formal body that represents the ecosystem or the cluster. It is just different actors doing the same kind of job. And every now and then, they have daily interactions because they, either through some supply and they have their favourite people. It is kind of really different in that sense. That is definitely one difference in terms of how they are organised. Then the second thing is, like I said, the state involvement and support. In Turkey, these SMEs, they are even scared to get... Not scared. Scared is not the right word. They are hesitant to get benefits from the state. So, they are the kind of people, at least the people that I have spoken to, mostly the kind of people that say, "Oh, I'd rather do what I can do with my own money and borrowing from the bank as opposed to benefiting from X and Y benefits." So, that kind of relationship developing with the state is in its initial stages. Even though some things are available. Some funds are available to renew their machinery, for instance. They may not take it. So, it is that kind of a relationship.

Sini Suomalainen [00:10:43]: But does it concern only textile industry or is it throughout the country, the same attitude?

Tulin Dzhengiz [00:10:49]: I do not know. What I've noticed when I was doing this research, is a lot of things are also regional. When you study a country like Turkey, it is a sizable country, and every region portrays actually some subcultures, let us say. And you observe differences in those subcultures and how they react. So, in the particular area that I have studied, there was this kind of pattern. But I'm sure in other areas this may be different. So, I think it is more regional than a national pattern perhaps. So, the other thing is that when we look at the ecosystem in Finland, we see that entrepreneurs play a very important role. In Turkey, we have entrepreneurs in the overall kind of textile ecosystem. But they are based on different cities and they are not connected to the main textile recyclers. So, the main textile recyclers are mostly based in a couple of cities in Turkey and I visited the most crowded city that has the majority of these textile recyclers. But they are

disconnected from these entrepreneurs that develop these innovative ideas. They are not speaking to each other.

Sini Suomalainen [00:12:17]: Innovative ideas. Do you mean like product development from the fibre?

Tulin Dzhengiz [00:12:22]: Yeah, for instance. So, when I joined some industry events, I had seen some people for instance that can develop leather-like products from olive oil stones. What is it called? The seed. Whatever. This is extremely interesting. And then there is a leather industry and there is the textile industry. They can make use of this kind of a product. But they are not connected to each other. They are very removed from each other. That is definitely different in Finland. Because, A) the industry as a size is smaller, for instance. And because it is also smaller, but also because there are many collaborative networks like FINIX and Telaketju and various other ones perhaps. Then what happens is that the entrepreneur and the recyclers and big textile companies get together in Finland. They sit on the same table and they discuss common issues. And it is more likely that it happens in Finland. It is less likely that it happens in Turkey. But I think now things are changing. So, traditionally this was not happening so much. Probably now gradually in Turkey also there is a shift towards especially this sustainability awareness and perhaps bringing people together. Then there is also a difference on the value chain dynamics. So, in Turkey, I felt that these textile recyclers are very much removed. So, in Finland, a company like the Infinitied Fiber or Spinnova can work directly with global fast fashion brands or sportswear brands, like Adidas for instance. So, they can build one-to-one partnerships with them. Even though they do recycling work and the work that they do resembles a lot what the actors are doing in Turkey. These hundreds of companies. In Turkey, they are always connected to the global brands via middle man. So, the power dynamics, because of the opposition in the whole value chain, and we can think of this value chain definitely as a global one, is very different. So, definitely that is another difference. Then of course, at a very general level, I would say that the recyclers in Finland, although few, a few companies do this kind of work in Finland. But when they do it and when they are

asked questions about what they do, they describe their work as circular fashion, circular textiles. And they definitely bring in some awareness on what is circular economy and how what they do is contributing towards circular economy, etcetera. When you speak to actors in Turkey, you will probably hear more the economic benefits and the economic motivations in doing this. Some will speak in awareness of sustainability. But circular economy is also a new topic there. So, it is only recently kind of the actors using the term. Industry actors, I mean, using the term. Otherwise there are NGOs that support circular fashion. They provide consultancy services. So, in that area, it is quite different. But the actual SMEs that perform this recycling work, they are not that aware of what they are doing sometimes. So, they are doing very good work, perhaps. Very environmentally beneficial work. But you would not hear that much of what you would think greenwashing. In Europe, you would definitely someone else was doing this kind of work, you would hear more of the environmental benefits than the people who do the same work in Turkey.

Sini Suomalainen [00:16:53]: Yeah. But anyways, they are doing kind of the same work what we are aiming at. Would you say so? And it is good business.

Tulin Dzhengiz [00:17:01]: Yes. It is very good business. It has been very good business so far for them.

Sini Suomalainen [00:17:09]: Can we be a bit more exact? Like to whom is it good business in the value chain?

Tulin Dzhengiz [00:17:16]: Yeah. To several actors then. I have to give you the picture of the value chain of how it works out.

Sini Suomalainen [00:17:24]: Excellent.

Tulin Dzhengiz [00:17:25]: In Turkey, of course, in the '80s, there were a lot of incentives to be in the textiles industry. Plus one of the selected industries where the country wanted to go. So, policy wise, there was that kind of support. Then historically, in textiles Turkey has also always been involved and an important country. And this was in different parts of the textile value chain. So, in Turkey, when you look at how textiles work is organised, you would see different cities almost specialising in different parts of the value chain. So, for instance, Bursa is traditionally known for silk. And then today is more known for good fabric. And then there is a city called Denizli. And this is known for towels. [chuckles 00:18:25] So, there are different cities that do different things. Of course then, when they produce the fabric, they end up with a lot of pre-consumer waste. So, when you have a lot of pre-consumer waste, you have to do something with it. Because you cannot keep storing. This is something that you cannot use anymore. So, what I mean by pre-consumer waste is a cut piece that is not gone into the particular item. Like if I am making a t-shirt, I would cut the neck part off that fabric. And then I would not use that neck part again. So, this is my waste. But it did not even end up with the consumer. So, it is in their terms quite a clean product in a way. Otherwise, if it was not cut from the neck, someone would be wearing it, buying it. So, this kind of waste was present. And in the early '80s perhaps, entrepreneurs from this particular region noticed that there is that kind of waste. And the workshops where these pieces of waste are present are trying to get rid of it. So, at that point in time, you would either burn it or you would give it to some people who would burn it. But you would have to pay them to remove your waste. It was really not valued. And so, when the first recyclers entered the industry, the stories go that these workshop owners were begging them to take this waste off their shoulders. And that is how this industry started. So, literally, there was very little cost to obtain this pre-consumer waste fabric. And it was only then investing in your machinery, getting a machine, usually this could be like a second-hand machine for instance that was used in Italy. So, that was also not that expensive. It did not have to be the most expensive one. And as a result, you would get a fibre that can be used. So, from zero value to a lot of value where you treat waste as a resource, not as waste.

Tulin Dzhengiz [00:21:07]: So, this was why it was beneficial, both, for the workshop owners and for the initial recyclers. So, what would happen then is of course in the beginning, they give names of which companies, but I will not share the company names for ethical reasons now. But a couple of entrepreneurs discovered this opportunity. And then they were followed. So, they often referred to this as a copy-paste model. So, other people, even other family members for instance, it could be uncles, cousins or also some friends, who saw this was profitable work. So, seeing the profits that were going really well. Considering the fact that the costs are really low naturally. So, lots of people entered into this industry. And that is why there is this geographical conglomeration, because if people who know each other, who saw the work and they kind of got together and they were like, "Ooh, you are doing this kind of work. How did you do it? Let me also buy a similar machine. Let me also start a workshop." And of course, then it is also the employees who know what kind of work. They start working in one little factory and they move to the other, et cetera. So, this particular region that I visited got this specialisation in cotton recycling. But of course, this is not the only type of recycling in Turkey.

Sini Suomalainen [00:22:52]: Is it typical that in one factory you have only one kind of material? So in one factory you have cotton and in another one you have wool? So, you do not need to separate there?

Tulin Dzhengiz [00:23:03]: Yes. So, there is that kind of specialisation. In fact, maybe in terms of specialisation, we can add a couple of things. Like how specialised these companies are in this particular region in Turkey. So, some only do black colour cotton. [chuckles 00:23:20] So, they may even specialise based on the colour. So, they may not even take other colours, but just take blacks or whites. Of course, there is also the size element of these firms. Most of them are SMEs. So, there are not that many big players in that sense that employ over 250 people. But some are big. Those that are big are also kind of vertically integrated. So, they start making the fibre and go all the way to making a blanket or a carpet out of that recycled fibre. So, there are vertically integrated and bigger companies. And then there are very small players that produce only one colour in a very small workshop. So, we are talking

about a variety of different companies here. And there is definitely a separation of even the providers. Because in the network, there is the workshop that I mentioned where the waste actually occurs. Now there are these storage and transportation people. So, these people are storing the pre-consumer waste and they are sorting them. So, all the colours and fabrics are sorted in the big warehouses.

Sini Suomalainen [00:24:44]: By hand?

Tulin Dzhengiz [00:24:44]: By hand. This is completely manual work. Because you need to be able to see the... Well, it is all based on manual labour and your eyes. [chuckles 00:24:57]

Sini Suomalainen [00:24:58]: Because it is really hard work to tell the difference between the materials. So, if this is like almost cotton or not so much almost cotton. So, how can the people do it?

Tulin Dzhengiz [00:25:10]: [laughs 00:25:10] It is not perfect. It is very imperfect. And this is a problem for the recyclers. They often also complain when I speak to them, how does this happen. They also complain about the fact that it is not always right. A) the colour tones exactly is a big problem to get exactly the same kind of colour and tone. Because they do not want to use much dye in the recycling process, you see. But of course, that is also an option. Some get their fibres dyed. But yeah, ideally, you can make it without dying them. And then the other thing is the content. So, that is a major problem. In Turkey, there are few places where they can get the content checked. But this particular cluster, even though they receive tons of waste everyday, unfortunately they did not yet have a common testing centre which would've made their work much easier, to be honest. Because they really have that kind of an issue. And I think this is a worldwide issue. It is not just specific to the recyclers in Turkey. But because of course in Turkey, these recyclers are dealing with tons of waste on a daily basis, it is very difficult to get the content exactly right.

And their customers learn that from them. So, the global players like H&M, Inditex, are giving their suppliers the necessity we want, I do not know, 10 percent, 90 percent, 15 percent, 85 percent, cotton-polyester mix. But the reality is, the products that are cut and chopped as waste are not categorised as with those... And it is very difficult then to get the right mix. So, here, there is a lot of local knowledge. And amazing kind of sense of workmanship, foremen. They know. So, there are people there that have worked in this industry for 30 years. And they really know how to get it right. They know how to get the colour and content right. It is completely tacit and not explicit. When you speak to them, sometimes they also cannot describe it so well. But they usually get it right in that kind of experience and passive knowledge of years. And the product gets tested at the end of the work.

Sini Suomalainen [00:28:00]: Is this all pre-consumer waste? Or do they handle some post-consumer?

Tulin Dzhengiz [00:28:07]: Definitely in Turkey, historically, there had been post-consumer waste recycling. But most of the recyclers that I have spoken to are sensitive in that they would like to highlight they are dealing mostly with pre-consumer waste. There are several reasons around it. First of all, of course, the post-consumer waste. As you know, there are lots of buttons and pieces that are sown together. So, it is more difficult to operationally handle. Requires perhaps more manual work in preparing them for recycling process. And then of course, I would say it is also not that organised. So, imagine with the fast fashion. So, the growth of this recycling work in Turkey is definitely tied to the growth of fast fashion world. And as you can imagine, because the fast fashion world had grown in such pace in the last kind of 20, 30 years, recycling world had also grown. That means when H&M is producing a type of t-shirt with a type of design and a particular colour, it is doing a lot of that t-shirt from different workshops. So, then it is possible to get the same colour and the same tone and the same fabric from different workshops when they all get put together. It is possible to create and recycle that. It is more difficult to do that for the post-consumer.

Sini Suomalainen [00:30:05]: What are the typical uses for the fibre when it goes out from the factory? What is it used for?

Tulin Dzhengiz [00:30:14]: Some companies are producing waste, recycled fibre, particularly for furniture industry. So, for global players like Ikea or their correspondence in Turkey or suppliers in Turkey. So, that can go inside your sofa and you would not even know. You would not realise it. That is usually a lower quality. There are nonwoven products. These are also made out of recycled fabric. But they have much more polyester content. And of course, that is the kind of lowest grade in terms of, let us say, quality. So, you would not use nonwoven product that much in a textile that you're wearing. There are different uses.

Sini Suomalainen [00:31:10]: But do they also make yarn out of the recycled fibre?

Tulin Dzhengiz [00:31:14]: Yes. You do have that. But you see, like I said, in Turkey, the organisation of this industry is so that it is... The whole industry is kind of organised in its value chain in different regions. So, it would not perhaps get yarn become yarn in that particular area. This was also something discussed amongst them. That should they also enter into yarn making. There were a couple of players, like I said before, who did their own carpet and who produced their own blankets out of recycled fibre. So, that is definitely one area. Socks is definitely one area. In fact, when you discuss with them how could you describe to me, where would I see recycled fibre? The most common example would be socks.

Sini Suomalainen [00:32:09]: Really? Because this is the first time I hear that you should make socks out of it.

Tulin Dzhengiz [00:32:14]: [laughs 00:32:14]

Sini Suomalainen [00:32:15]: Why is that?

Tulin Dzhengiz [00:32:17]: Well, you know, when you wear some socks and they leave this kind of almost dust and kind of little cotton pieces in your toes. That is how they describe the work of recycled fibre. [laughs 00:32:32] So, when you're recycling the cotton, you see a lot of dust occurs naturally, right? So, this cotton dust. And when you're wearing the socks made out of this, it would also be that you would see them. So, it is very apparent. Everyday when you wear new socks and you experience that you can think of, does this have recycled content and if so, how much? Because that is something. That is an area that it goes into. So, I was very surprised as well, but also the people in the industry can say, even looking at a t-shirt, how much recycled content is in there.

Sini Suomalainen [00:33:21]: Do you mean if it was virgin material, it would not create the dust so much?

Tulin Dzhengiz [00:33:27]: No, it would not create that much. When they recycle, they always add also polyester. So, whether this is a virgin polyester or recycled polyester, this is another problem regarding, both, the sustainability and the circularity of the products that they are making. And this is again a problem that is global. Because I know that in Finland, also there are some players that do recycle and they do not use any polyester. So, this is quite rare. Very innovative. But also there are recyclers who use polyester. This is also another problem of the whole textile recycling world. There needs to be more innovation in terms of materials that can substitute that, and perhaps finding ways of recycling that would not require that. But in this location, you also have to realise that the reason why these recyclers that I have visited are attractive, are also kind of like due to price. So, you have to balance that a bit. But yeah, definitely those kinds of quality-related issues to do with the recycled materials that needs to be enhanced.

Sini Suomalainen [00:35:04]: It really seems to work in Turkey. Like the textile circularity already is there in many parts. Probably not in the post-consumer, but in the pre-consumer, everything seems to be in use. So, what would you say, Tulin? What is the secret of the Turkish textile circularity?

Tulin Dzhengiz [00:35:23]: I would not say it really works. I would say, there are lots of companies, because it is a profitable business. I would not say it works in the same kind of way. And I definitely understand where you come from when you say, it really works in Turkey. I can understand the difficulties of setting something up. But of course, A) the timing is different. So, first of all, in for instance Finland, the history of the whole textiles industry is quite different than in Turkey. So, there are definitely these what we could call the past dependencies. They're very different. So, there is definitely that historical element. And then, there is definitely also this idea of cheap labour that is present. So, it works. But it works thanks to many women. The separation work is done mostly by the colour separation. Even on the spot, when you are recycling and you are inside these factories, you would see maybe five, 10 women together separating what goes into the machine and what gets out. Based on the tone and the fabric. But this is cheap labour. And it would be difficult to organise it in the same kind of way in Finland. Like it currently is in Turkey the way it is. So, that is definitely something that is to consider. Then also, we have not really touched upon those things, but I must say also that the whole value chain and its organisation is also full of problems and power imbalances. Traditionally, the recyclers had so much power because there were not really many collectors and transporters of this waste. And today, we have a different kind of scenario because the industry in itself, the recycling work in itself, have grown so much that there is need for other players, the middleman, to collect it and to store it and then to transport it. And there is this kind of price negotiation between these two different actors, the recyclers and the collectors and transporters, let us say. And then also in time, the price of pre-consumer waste had increased a lot. Obviously, I talked about the stories around how it was free and workshop owners begging recyclers to take it in the past. Now, it is not like that. So, now, this is quite expensive. Also because there is more demand to recycled fibre. So, that means that it keeps increasing the price and also with the kind of COVID period, I think it affected it negatively further. The kind of

environmental issues around recycling is not that much discussed because it is generally perceived this is recycling work. But in fact, of course, there are some environmental issues that can be enhanced. For instance, the polyester that I kept mentioning. Which is also problematic because we're talking about circular economy. So, if we are talking about circular economy, the same product with the polyester content comes back to them, travels back to them. And that means that when it travels back to them, it is again them putting more polyester content into that. And every time then the quality drops. So, it becomes not more ideal upcycling word. But more downcycling. Not that ideal in the end, to be honest.

Sini Suomalainen [00:40:07]: Okay. So, the problem is far from solved in Turkey too?

Tulin Dzhengiz [00:40:11]: No, no. Definitely not. I did not even start talking about the social issues. So, the collection work. Imagine there being loads of workshops in Turkey, all around. And these collection and storage spots, let us say, networks, whatever you'd like to call them. They are of course also far from perfect. They would like to also use cheap labour. And the cheapest labour around to collect some sort of waste from one workshop and from another workshop, and just to pick those up, pick these waste pieces up. It can be refugee work, migrant work. There are registered companies that do this very neatly. I'm not talking about those. But there are also those companies that are collecting whatever they could find via the network of the cheapest labour they could get. So, when you look at all of this, it is far from perfect also in Turkey. Like everywhere else right now in the world. But it has a lot of potential. Perhaps that is what we could underline. That for me, the region that I had visited, I definitely felt like this should be a circular city. And I felt some of the recyclers perhaps were very modest about the environmental benefits. But seeing the amount of trucks coming in and knowing the fact that that waste either was going to go to landfill or was going to go into incineration, and instead became a fibre again, and seeing how that is all done, it was also something that is very moving. So, it has an extreme potential and it just needs more collaboration.

Sini Suomalainen [00:42:16]: Thanks, Tulin. This was an excellent explanation and description of this issue. Do you have some final takeaways to give to our listeners?

Tulin Dzhengiz [00:42:27]: I think this kind of work organising circular textile system needs to be co-operative. That means we need definitely some form of co-operation with the state, the government. And we also need involvement of academics together with industry. So, this kind of approach is definitely needed. And we need to discuss more the social dimension also, of textile recycling. So, when we talk about textile recycling, we always imagine, this is environmentally good work because this is saving something that would've been thrown away or burnt into something valuable. And taking waste out of the system. It is re-purposing the material. So, it is great work. Because it is cotton. We always discuss how cotton is in terms of environmental impact on the water waste. So, we are saying we are saving lots of water by recycling cotton products. These are all true. But there is also the element of tracing and tracing it transparently. So, this track and trace system is now coming in and there are more discussion in the industry as well. This is very important also. We need to know also the social side. So, who has collected this waste? Is it a refugee? Have they been paid fairly? Have they even been paid at all or how were they paid? And were they taxed? Because we are discussing a lot. We are focusing on the tax scandals of big corporations. But we are not aware of the tax issues that might happen in this kind of an industry. So, we have to kind of make this industry transparent. We have to definitely have attention on this social dimension as well as the environmental dimension. And we need to discuss at every industry perhaps. What is the value of waste? How do we put the value on it? Who puts the value on it? How do we decide how much it is worth? I think it is very important. And we need to have these conversations that we have together, collectively, from academia, industry and state together. Different actors.

Sini Suomalainen [00:45:18]: Thanks, Tulin, for this interesting conversation. Tulin is planning to write an article about all this and it will be published probably in Medium or some other media. So, it will be pretty easy reading. Not academic article, but

conversational. Just like this podcast. I will definitely share it at Kuituus social media. So, stay tuned. Thanks, Tulin, and merry Christmas.

[music 00:45:47]

[äänite päättyy/recording ends]