

The following content is provided under a Creative Commons license. Your support will help MIT OpenCourseWare continue to offer high quality educational resources for free. To make a donation or view additional materials from hundreds of MIT courses, visit MIT OpenCourseWare at ocw.mit.edu.

PROFESSOR: OK, great. So I think it's about time to get started. So good afternoon. So let me see. So what do you think about [? Genco? ?] [? Or Genco, ?] I guess. [? Genco ?] [? Genco? ?] You never know. It was a good talk. I enjoyed it. Did you enjoy it? Yeah, it was interesting. So let's talk about the-- just to kind of refresh your memory. And then we move into the two more things I want to cover today. We want to cover the willful case study-- kind of to close this notion of reverse logistics and closed-loop supply chains a little bit.

But before we start, we read quickly a study of ReCellular that was really try to connect with some of the things that we heard from [? Genco-- ?] [? Genco? ?] Genco. And I wanted to know-- I read the responses, the homework, and you were split. So some of you did think that ReCellular had a future, and others thought that they were beginning to disappear as a company. So who wants to be the voice of ReCellular-- well, before we start, well, since this is your first time I see you here-- you were traveling. So do you remember what is the basic business model of ReCellular?

AUDIENCE: Yeah, I do. [INAUDIBLE] I was one of the guys for it, actually.

PROFESSOR: Well, it's all great. So why don't you give us a quick recap of what ReCellular does? Just in 10 minutes or less.

AUDIENCE: They are-- [INAUDIBLE]

PROFESSOR: A couple minutes, OK?

AUDIENCE: --cellphones and repurposing them and selling them to other markets-- markets that, you know, may think those cell-- give us certain value for those secondhand

cellphones. And they get them from various sources, including the donation bin type sources as well as some higher quality sources.

PROFESSOR: Great. So who else was in favor, or thought that the ReCellular model had some future? Four? So who wants to-- [? Marianna? ?] Do you want to try to do it?

AUDIENCE: Sure.

PROFESSOR: Give your pitch.

AUDIENCE: Well, my [INAUDIBLE] I think they have a future because people who always consume cellphones. They might evolve into something else, like we have seen it [INAUDIBLE] composites or something. But that same instrument to talk and surf the web, and what we're doing now with phones will evolve, and they can tap into that industry. It might not be cellphones, but it will something else. And they can tap into that and reach-- as long as they keep up with it. Which I think by them going to the e-commerce gives them a good sign that management is doing a good job of keeping up with technology and making it, keeping it global. So I think that's why I see a good future.

PROFESSOR: What do you think is the biggest bottleneck of ReCellular?

AUDIENCE: The fast evolution of equipment, of the technology is a thing. The other one is as they say the standards are not the same in all countries. However, the fact that they have different markets in each country also works in their advantage. For example, in Latin America, you get equipment that is refurbished, and it, you don't, doesn't care. You have the technology in hand. And I'm sure it's the same in developing countries. And I see that as working to their advantage, as well, for that.

PROFESSOR: OK, great. So someone that doesn't think ReCellular has a chance?

AUDIENCE: I guess they've got their current business model getting donated cellphones just wasn't viable because, you know, there was a time when, you know, people usually got their cellphone for free. And then after two years ago, they got another one for free, and they said, OK. I don't need this anymore. And they throw it in the donation

bin. But now people pay lot of money for their cellphone. And they want some of that value back, or they still see the value at the end, so they have to shift their model where maybe they're actually paying you at this kind of rate for someone's old cellphone. Which you see now, like [INAUDIBLE].

PROFESSOR: Yes. We cannot hear anything at all from here. You can hear me, but nobody else. So Michael can you help us with the mics? I'll try to repeat in a sec, but keep going then please.

AUDIENCE: At [? least ?] I think they have to shift towards basically purchasing these phones from people, not relying so much off of third-party collectors if they want remain viable.

PROFESSOR: So your main concern is that the shifting business model of cellphones or electronics is you're paying for them, that you don't want to donate it anymore. And that's kind of the main way how ReCellular is trying to make money is by getting them donated and trying to make money out of that donation. So basically you're arguing that there may not be enough residual value to buy a phone, because they could pay a little bit for it, right? And then they will--

[INTERPOSING VOICES]

AUDIENCE: Can't rely so much as getting it to the third-party collectors.

PROFESSOR: But you think they pay for it , will that make them viable?

AUDIENCE: Yes.

PROFESSOR: OK. Somebody that's doesn't agree.

AUDIENCE: So [INAUDIBLE] the point of-- I don't think it'll, it'll--

PROFESSOR: I'm checking to see if they could hear.

AUDIENCE: Can they?

PROFESSOR: Can you hear right now, or the same as [? before? ?] Can you hear better?

AUDIENCE: Yes, [? it is better. ?]

PROFESSOR: OK.

AUDIENCE: OK, so I think the business model was more viable the beginning where the cellular industry was starting, and part of lifetime like was [? say ?] much longer. But now you have new models coming all the time, and that significantly decreases the price they you can get for a secondhand phone. So for example, previously maybe you had, I don't know, 50 models of cellphones come out in a year, and now you might have 200. I don't know. I'm making the numbers up, but you do have much more offers right now. So the price you can get is pretty, I think it'll decline. And as a result, you'll have less revenue, so I don't think that it's so viable.

PROFESSOR: OK

AUDIENCE: I think to add onto the point, right now, I mean, we're talking about enough, almost like one to one ratio of cellphones and people on Earth. So we're talking about large manufacturing volumes, which means that the cost, the price has also decreased. So that would decrease the attractiveness of secondhand phones. And also, I mean, that differential that ReCellular is trying to play on-- how much they buy the phones as compared to how much they can sell the phones.

PROFESSOR: So it is shrinking margins that you think are going to be a problem. So you want to go back and say why ReCellular can still make money.

AUDIENCE: Yes. And I mean like a good point that was raised, I think one first thing about prices-- I don't think that the price going down is bad from the customer's perspective. And what I used is technology lifecycle model. So there is a lot of innovation. And there are early adopters in the early majority, but there are also laggards and people who are not adopting the [INAUDIBLE] and who are just really happy to have really low-priced phone because they value more the price rather than the technology.

And so there's at least one third or more of the market that is actually asking for the

secondary phones because they don't value as much the technology. And they have just more choice because a lot of different phones actually that are being put on the market. [INAUDIBLE] so those people have actually larger choice for like a lower price. And from a customer perspective and from a demand standpoint, I think this is a good thing. And so the business model might have to change a little bit because they will have more margins or so, but they have demand. So they do the right adjustments [INAUDIBLE] and they have quality [INAUDIBLE] that quality of phone offered. I think that is really a way to make their way through the secondary market.

PROFESSOR: So the argument here is that even though the margin could shrink over time, there's always an adoption of any technology. There's always laggards. So there's always a market, basically. Yeah? The question is, well, you probably have to be more efficient or-- so part of the argument is they are the first. If you are among the first, you could probably get scale, and you can be more competitive. I don't know.

AUDIENCE: Part of my reason for thinking they're not going to last is that they do one and only one thing. And we find all the time that companies who do one thing don't survive when the next disruptive technology comes along. I guess what I'm saying I disagree with the fundamental assumption that people will always have cellphones. That's what we said about horses. That's what we said about newspapers. Things go away

AUDIENCE: I said that they would evolve.

PROFESSOR: Yeah. So maybe There is the electronics so they need to add something else, yeah?

AUDIENCE: And also [INAUDIBLE] emerging countries. The cellphones [INAUDIBLE] large market to penetrate. And we can see that with mobile payment. People are just buying phones when there's really accessing ways to pay for those phones because it's also [INAUDIBLE]. So even if we at some point in the future don't have phones anymore, they can still in the meantime sell to other people. And what I think is that they can adapt. And if they, if we don't have phones at some point, and we have

something else, then we can sell [INAUDIBLE] something else to people afterwards.
So this [? big timeline ?] still goes on.

PROFESSOR: OK. So let's say I just check with our friends from Zaragoza. Do you hear any of that discussion?

AUDIENCE: Yeah. We heard part of it, so--

PROFESSOR: OK?

AUDIENCE: It's OK.

PROFESSOR: OK, good. Just want to double check. All right so here's the challenge, right? So we, I am hopeful that ReCellular can survive, or one way or the other. But the question is what happens when ReCellular does not survive? There's not a business to be made. So, what will happen with those phones?

AUDIENCE: [? Genco will ?] get them.

PROFESSOR: [? Genco will ?] get them. Yeah. So the we heard that the difference is ReCellular is a specialized, very niche, reverse logistics provider. Genco is completely diversified. So they take anything that their are customers want-- in this case, the customers is the retailers. The customers is the [? rest. ?] So I think that is, what many of you pointed out, one of the big differences is Genco's with its [? moral ?] is more towards partnership with the retailers. Really, that's their customer.

ReCellular, on the other hand, wants to go to the end customer. They want to get us more engaged one way or the other. Of course, most of their purchases come from dealers. So they have another option. And they try to go to end consumers to try to penetrate the market more. But it's a challenging environment. Which gets us to Whirlpool. Whirlpool, Whirlpool, Whirlpool. So what do we do with Whirlpool? So the way I would like to start-- any other comments? I cannot, not sure if they're going to survive or not. But--

AUDIENCE: Every time a fly to Brazil, I can pay for my ticket by reselling the cellphone that's in my pocket. There's definitely a future for ReCellular.

PROFESSOR: There's-- hopefully there's enough market. And I believe there's enough, but there's lots of pressures. To be honest, I [? see ?] becomes the margins lower and lower. Who knows.

AUDIENCE: I was curious. I didn't see exactly when that was published. Oh. This case was five years ago, or so? So it's a little bit older. So ReCellular is still around. I don't know how good are they right now-- thriving or not. OK, good. So let's go to Whirlpool. Unless there's any other closing comments or questions about ReCellular or Genco? Zaragoza, any comments or questions? Final thoughts? No?

AUDIENCE: No.

PROFESSOR: OK. Remember wave--

AUDIENCE: Thanks.

PROFESSOR: --the hands. Otherwise, I cannot see you. All right. So let's go to Whirlpool. And to do Whirlpool, we're going to spend a little bit more time on it. And what we will start with is who wants to tell me what should Whirlpool do? So what, which are the choices of Whirlpool? Let's start with you.

AUDIENCE: So the choices are to go with the IFO model--

PROFESSOR: Can you explain what IFO is? Quickly?

AUDIENCE: So the IFO is an industry-funded organization in which-- it's from what I understand, it's kind of like a third party that kind of collects-- you know, it's owned by all these industry players, and they collect the appliances, and then [INAUDIBLE] with the public.

PROFESSOR: So if we're pulling at words-- Genco, but funded by a bunch of [? same ?] the suplex. And they all pay Genco, and Genco does it. Pretty much.

AUDIENCE: Another way, a second method is for Whirlpool to be an IFO on it's own, or to run a closed-loop system. And collect their own appliances at the end of life.

PROFESSOR: Closed-loop system-- so in this context, we probably have not defined closed-loop properly. It's just the same company that sells a product, wants to get it back. And try to keep it within your own system, as opposed to getting somebody else to deal with it and take care of it. And you want to somehow extract value out of the process and bring those materials back into your same supply chain as best as possible. And that's why the option and this closed-loop is closed loop-- doing it alone. [? A little bit ?] alone, at least it cannot, right? Do it by why will they even--

AUDIENCE: There's a third option--

PROFESSOR: Which is?

AUDIENCE: -which is to do nothing.

PROFESSOR: Ah. Third option. Of course.

[INTERPOSING VOICES]

PROFESSOR: More than do nothing Do nothing is no longer an option. Do nothing was an option maybe in 2005 for these guys.

[INTERPOSING VOICES]

PROFESSOR: Yeah, I know. I know what you meant. Yeah. So third option is to oppose the regulation. Oppose the regulation. So let me start doing with a little show of hands. How many people think that they should go with the industry-funded option? Zaragoza one, two, any one there? That's two people.

AUDIENCE: Two and a half.

PROFESSOR: Two and a half? No halves here.

AUDIENCE: I'm doing, I'm going with three and then one.

PROFESSOR: Oh. OK. So if it doesn't work? OK. Two. How many would like to oppose regulation? One, two, three? Look like there's three. So I take the rest of you would like to do it on your own, right? So let's start with the-- so you already spoke-- who else wants

to oppose regulation? Why would you oppose regulation?

AUDIENCE: Well, can I also qualify to say if I had to be one or two, I would pick two.

PROFESSOR: Yeah.

AUDIENCE: But the idea was that it's not really be helpful because a lot of this process is self-sufficient to begin with. I think they said like 95% of all of these products go to the recycling process and hardly any of it go to the landfill just because there's a lot of commodities that are in these products like aluminum, or aluminium-- whatever-- copper, stuff like that. So all this stuff gets reclaimed. So you don't need to do something that's going to add a lot of overhead to people's businesses to have them do something that's pretty much already happening on its own.

PROFESSOR: So it happens on its own. What are the rates? Someone remembers of recycling?

AUDIENCE: It's like 95% to 99%. That's pretty good, right?

AUDIENCE: Those were Whirlpool's numbers.

PROFESSOR: They're pretty good, pretty consistent. Let's trust them. Let's trust them. These are factual numbers. So 95% of it is kind of being naturally repurposed, recycled in some way or another through our normal network. We're going back to, we're discussing all the different products-- cars and t-shirts. Cars have a lot of value. Appliances have a lot of value. They're designed for a very, very long time. So someone wants to kind of move that chain of how much value having the latest model of refrigerator or not. And eventually when it goes to the bottom of that chain, that person also wants to maybe make the effort to try to get some value. And a dealer gets it and scraps it and divides it into all the metals and eventually gets done.

AUDIENCE: I would argue it's more of an effort for someone not to recycle their old washing machine, to like pick it up and take it to the landfill. It's not like you're throwing away batteries. I mean, most people get rid of their stuff by putting it outside in front of their house, and then someone picks it up. So if the process already works? Like

those 5% who aren't recycling it, or whatever, they're probably not going to just because Whirlpool came up with a closed-loop system. So it's really not going to add any--

PROFESSOR: So those 5% have their own landfills. They will still trash it, yeah?

AUDIENCE: [INAUDIBLE]

PROFESSOR: OK. they'll leave it there hanging. Those are the ones that are not accounted for, right? Those are the ones that are still your houses, landfill somewhere. OK, good. So what is-- yeah? You want to add something else on the--

AUDIENCE: Yeah. I just want to [? comment made ?] I think that the problem with that even though it seems to be working, [? it's like ?] perpetuates a mentality that I can just put something out on my, you know, on my driveway or on the sidewalk and someone else will take care of it. And I think that's a big issue in the US at least [INAUDIBLE].

PROFESSOR: So this is the working part is that it naturally the market is. But there's something about the overall social norms changes that you would like to maybe to? So this is part of a trend, right? So this is Canada, right? We're not talking about the US here. It's Canada so people are very conscious. They're already doing lots of recycling. There's lots of other programs going on. Eh? So this is natural progression. But a couple of people that maybe-- who thought that the one regulation is still not enough. So one reason is social. Which is the other reason?

AUDIENCE: Well, I [INAUDIBLE] prices of all the cohesion are pretty high, but what happens if at some point the prices are not high enough to give incentive to recycle? There's a second point. And also [INAUDIBLE] new regulations [INAUDIBLE] There's an example about mercury. They may need to regulate mercury, how we get that mercury. How will we show that all the scavengers that deal with maybe some of the material correctly so the person [INAUDIBLE]

AUDIENCE: Refridgerant, for example.

PROFESSOR: Refrigerant. So there's a couple of things that we know that they are recycled. We know that those materials are being somehow repurposed-- a big chunk of them. So the problem is that if the prices change, boom. This market will collapse. Maybe there's innovation in materials. And they come up with a new material that is an alloy-- plastic. Who knows-- that is still as good performing as the need for the structure of the refrigerator that is not as recyclable or is very expensive. And then you have much [? our ?] waste. So there's a little bit of an uncertainty factor. Then clearly what they're trying to get out of it what is the most value and what they know how to deal with. And mercury and refrigerants are a little more tricky. And it's unclear to know if they're doing properly.

So there's a little bit of a tricky part there. But there may be other options of regulation instead of these ones. So this is the regulation that what they are opposing is the extended producers' responsibility, the EPR responsibility. That is Whirlpool is to be responsible over the whole thing. But there are other things that could do. Adjust to tackle mercury and refrigerant, for example. What could they do if they only want to fix that problem? Why would the government, what could the government do? Without doing this whole, very complicated process?

AUDIENCE: It's what they're doing to laptops. They just ban the product, or ban the hazardous material.

PROFESSOR: So some pieces you can ask manufacturers to phase this out of their products altogether, right? So you work with the manufacturers, and you so some sort of agreement, technology path. And then eventually you can get rid of that. That's one option. Any other options? Zaragoza, any other options? They're silent today.

AUDIENCE: We have the mic off just to make sure we don't have echo.

PROFESSOR: So any other options?

AUDIENCE: Guys?

PROFESSOR: No options. The other one is to try these dealers, maybe, right-- these current recyclers and train them to do better mercury management? You can do a whole

program, right, where you can just instead of involving everyone you just go to the market directly and do it. Those are a few things you could do instead of regulation. But let's move to the other two options. IFO versus closed loop-- who chose the IFO more? So, well, no one in Zaragoza, so maybe I'll give you a chance. So why will the IFO model be a good chance for Whirlpool?

AUDIENCE: Well, I voted for that because that leaves time and flexibility for the regulation to change. I said if you go with an IFO, gives you more time to see how things [? structure ?] really works, how they can look internally to see how the closed loop can be designed [INAUDIBLE]. I thought more as a temporary solution, and then because it's way more expensive, right? It would take three, four times according to my garbage to go through. So I said do it for a period of time, and then once you change the closed group, you can pay back an actually meet how the regulation would go [INAUDIBLE].

PROFESSOR: So this is like a good, safe place to start the process.

AUDIENCE: To start. And then move ahead either regulation change or the closed loop. Turns out to be more effective than expected.

PROFESSOR: All right. So what do you say about that?

AUDIENCE: I haven't been because I'm still not on Stellar.

PROFESSOR: Oh, you're still not on Stellar.

AUDIENCE: My first class.

PROFESSOR: OK. OK. All right. So they--

AUDIENCE: I said that you should go with a closed loop because, I think, assuming that you're going to have to get there eventually even though it's more start-up costs. Putting the time in and getting the jump on it could make them a leader in this. If they know they're going to go there, and they already have started to make their machines more [? grave, ?] then they can stand to benefit from optimizing their processes and

manufacturing their system vice continuing to pay for people who aren't as advanced as they are with their recycling technology.

AUDIENCE: Adding to that, you also address customer loyalty. Not only are you there when they start using [INAUDIBLE] actually have a lot of impact in a future sense.

AUDIENCE: [INAUDIBLE] common culture is very in-house [INAUDIBLE] doing their own thing so I [? thought ?] the closed loop, maybe like [INAUDIBLE] [? as ?] the industry will grow they will say to the customer how important it is to have [INAUDIBLE]

PROFESSOR: OK. Do you want to defend your IFO choice? So basically why I chose IFO was as to me so I worked under the assumption that legislation would pass

[INTERPOSING VOICES]

PROFESSOR: Sure.

AUDIENCE: So [INAUDIBLE] the legislation passed soon, and that there are fines for not complying, you going to closed loop you have to develop a logistics system that's really, that gets to every part of Canada, basically. Which is a huge country. And you need to make investments in, for example, vehicles to pick up the refrigerators and the ovens, the washing machines, and all this. So I believe that this was too much of a cost to effectively reach all of the customers that it has. And that under the IFO model since there was something consolidated, you were taking advantage of the economies of scale of, well, you would reach all the customers in all of Canada, but for not just 30% of the market, but for the entire 100% of the market. And you get the economies of scale of that.

PROFESSOR: So if I make [INAUDIBLE] this argument is, well, I can make investment money many, many places, right? I could invest in better products. I could invest maybe in other places. So why should I put my money in developing this new network if I could just pull my resources with others. And then try to make, pay potentially less. We'll talk about the cost later, yeah? And decide what happens. Do you want to add something to the argument?

AUDIENCE: Speaking of the economies of scale, 95% to around 95% of the machines are currently not making their way to the landfill. I'm not sure that there's an economy of scale to justify the up-front costs for a closed-loop system.

PROFESSOR: So, yeah, so there's not even enough volume even, right? Because people are naturally recycling.

AUDIENCE: [INAUDIBLE] about these costs and [INAUDIBLE]

PROFESSOR: So here you have, you control the costs. Here you may get scale. Maybe. Maybe, right? The scale is much more certain here. Here you control the cost more. OK, great. So those are the options. And it's hard to make a call here without some number. So who is brave enough to walk us through their calculations on how much this thing cost for Whirlpool? Let's try to make a few estimates to see and try to make a decision is this really more expensive or not.

From an industry IFO versus the closed loop. So what I'll do is maybe someone is willing to risk and tell me how much is the cost per ton of doing an IFO model. Do you remember? I have your [? papers ?] here so [? someone ?] I can open it, or your document, I can be happy to open it. So we see how do you get to that number. Because those are numbers you have to do eventually if you want to analyze the systems. So what is the cost per ton more or less, or per pound? I'm sure all of you computed to get these numbers. Let me get mine here. See more or less what they were. Someone remembers? How much money will this cost to Whirlpool? Total money. You remember?

[INTERPOSING VOICES]

PROFESSOR: How many?

AUDIENCE: \$35 million.

PROFESSOR: \$35 million.

AUDIENCE: [? Since ?] 2008.

AUDIENCE: IFO?

AUDIENCE: IFO, yeah.

AUDIENCE: [INAUDIBLE]

AUDIENCE: That's based on the fact that there's 100 kilotons of stuff being thrown away. And 30% of it is Whirlpool. And then I found some data somewhere in a case study that had dollar per ton, and I applied the collection, transport and processing-- numbers that were there.

PROFESSOR: So there was [? an existing ?] to how all of this cost per ton of collection, dollars, et cetera, et cetera. And you can apply that. You add it up that gives you roughly like \$1,000 or something of the collection costs?

AUDIENCE: Yeah. I assumed the most expensive route for the trucks, and the full trucks, as well.

PROFESSOR: And that gave you like \$35 million to do IFO.

AUDIENCE: For 2008, yeah.

PROFESSOR: For 2008 figures.

AUDIENCE: I did something similar with average numbers and ended up same ballpark-- \$24 million.

PROFESSOR: \$24 million? \$10 million more. I will argue. But still-- it's a big number. It's a big ballpark. Someone got a different number? So that looks like a big number, but how big is it compared to what it will cost--

AUDIENCE: It's tiny. They spend \$202 million to ship the stuff out to customers. How much they spend? 200 and-- how'd you get the number? 220 million. Other assumptions. I assumed \$40 per appliance delivery--

PROFESSOR: How much was the, \$40 per--

AUDIENCE: \$40 per appliance delivery, yeah? And 5 million appliances, large appliances shipped in 2008. Mind you that's I didn't take the 30% of that number, so it would be 30% of \$202 million, so about \$70 million--

PROFESSOR: Around \$70 million

AUDIENCE: --for Whirlpool washers.

PROFESSOR: So that would be about this number [INAUDIBLE]

AUDIENCE: I'm sure it was about right.

AUDIENCE: That number is going on the customer in terms of the delivery fee.

PROFESSOR: And it says that it counts for the costs so the customer does pay for it.

[INTERPOSING VOICES]

PROFESSOR: --right now for the retailer. But this is the collection fees.

AUDIENCE: Yeah, but I'm just saying like right now like they haven't, their cost for delivery isn't really a cost to them because they're probably making money off of the delivery, you know. They're probably charging more than it actually costs. So, I mean, just a footnote.

PROFESSOR: Yeah. So it's-- so to build to make this choices we have to make these calculations right. So the number I got--

[INTERPOSING VOICES]

PROFESSOR: Yeah. The numbers I have are more towards the \$35 million, but for 2020 numbers, no 2008 numbers. Why 2020? Remember that in some way you only see things that are discarded. The things that are kind of naturally progress from one place to the other, you don't see those. The Whirlpool case had a table somewhere-- exhibit seven-- and this gives you a sense of the units discarded in 2020. So those are the total discarded units of all different kinds of appliances. So you can get their refrigerators, freezers, dishwashers, cooking ranges, [INAUDIBLE] [? and some ?]

washers and so forth, yeah?

Then there's a table, I think on top, that has more or less the amount of steel, aluminum, copper, et cetera, and the weight of each appliance. So you can get the total number of appliances times the weight of those appliances, and they give you how many tons you have to let's say, get back. Once you compute those tons you need to get back, those are now all yours, right? You'll be responsible for your market share. You said 30%, but actually Whirlpool does Whirlpool and Kenmore. So it's close to 48% more or less of the market. 48% of the market share, and then you get those numbers.

And that's the total tonnage. So what you can sell, you make money out of it. Because you can sell it, right? You get it and you make money out of it. And then you pay, and that's the tricky part. There's a collection cost on exhibit four. It's a collection per ton. That's come from the previous program, [? the We ?] program. And it says, roughly-- you know, in the [? We ?] program is an IFO program. It gives you \$165 to collect per ton. And you can then add all those numbers, and it gives you \$37 million. I'll put a table, but those are more, those are rough numbers that you get.

And I give you 7 million for the cost for doing this. Which translates into a \$47 per unit more or less. So the cost of IFO is equal to \$47 per unit sold. \$47 per unit. How does that compare to their distribution costs? That's how we know it's expensive or not. How do you compute the distribution cost of Whirlpool? Someone did that? So we know more [? than ?] to compare how they do it. That's the reverse part-- \$47 per unit.

AUDIENCE: Well, if I know it's different, so I did do it with 30% of market share, not 48%. But they said that it's approximate for the industry standard 10% of their sales.

PROFESSOR: Yeah.

AUDIENCE: And so I would say that they were selling [INAUDIBLE] per 100,000 units but that's 30% of the market. And you change it to 48%.

PROFESSOR: Yeah, but that's the right number. So the approximate costs are 10%.

AUDIENCE: Yeah, so it changes--

PROFESSOR: Exactly. So now there's another number somewhere in the case that is \$1,000 per unit. That's the average retail price. Now you can also assume a margin, you know, of a retailer. 30% margin, 25% margin is not uncommon for these kind of appliances. So I give you \$700 more or less per the cost of the goods. So the forward supply chain of Whirlpool is more or less \$70. Forward supply chain. So it gives us like \$70 I guess per unit.

So it's 10% of our sales price, \$1,000. 30% margin, let's suppose if our retailer they give us \$700 is the cost of Whirlpool of those 10% of distribution costs. So it gives \$70 per unit. Now the IFO cost here-- this cost includes selling the scrap metals and recovering all the value of those metals. If you get that out, this costs you \$80 per unit. If you just look at the direct costs of, you know, recovering all this material.

AUDIENCE: I just have one other question. So for the Whirlpool forward chain, that's the 10% of the cost, but that is usually bringing it to the retailer, right?

PROFESSOR: Exactly.

AUDIENCE: So should we consider the fee that is charged to customers to get to their home? Because for the reverse supply chain, we kind of would have to pick them from the home, right?

PROFESSOR: So we could talk about the network design, as well. Yeah. Let's talk about the options to try to be discussed. But to get started, these are the two numbers we need to compare. So \$70 per unit is the cost of getting to the dealer, to the retailer, sorry-- or the dealer of the appliance. \$70 per unit. To get it back without getting a scrap is \$80 per unit. Why is this higher, you know, compared to this one?

AUDIENCE: Well, it's centralized distribution.

PROFESSOR: Centralized distribution, right? This, my network is not designed to collect stuff. So

since it's not designed to collect stuff, the IFO model, even if it's the IFO model, Whirlpool is very specialized in forward. These numbers, even the rough numbers-- this is the kind of environment that you face the first time you go into any reverse logistics cost. That-- maybe the numbers are not that big when you look at the whole Whirlpool corporation, but when you start looking back and try to nail down and compute your distribution costs,

This is more or less the situation you will face the first time around. Your forward cost per unit \$70. Your reverse could be higher than that. Mainly because you are not using a optimized, well-designed network. Which get us to the different options that we have to make this \$80 down. So it goes back to-- now we can put a little bit more, let's say, meat to this. So if the IFO model, assuming our estimates are OK, costs us roughly \$80 per unit, and this one costs us roughly \$70 per unit.

So if the IFO gets super efficient, and it really costs me much less-- well, actually it doesn't cost me really \$80 per unit. It costs me \$47. But I can also do it here and then sell the scraps. That's why I'm computing this one to the other. So if the IFO pure distribution costs get down to much lower than \$70, right, maybe is worth doing with them. If they can get to the scale, and once they recover the investments, that they have the plan-- if this number gets less than \$70, maybe it's worth for me to jump there.

On a cost, pure cost perspective, on the other hand, we have some of the other options here that will give me value. So with that, let me just ask how will a closed loop-- how do I want to compare the actual networks to see how different they are-- the IFO versus the closed loop network of Whirlpool? So who wants to draw a diagram of how do you think Whirlpool closed-loop supply chain could look like? Someone volunteers? I'll volunteer someone. How is the current supply chain working? Go for it. You can use that one. And let's go back to where is the retailer, where is the dealer, and so forth. Give it a shot.

AUDIENCE:

So forward supply chain, you have one or two factories where they make the stuff. They go to a series of regional distribution centers. And each of these, in turn goes

to the series of retailers.

PROFESSOR: Sure. So there's actually how many factories does Whirlpool have? [? No one ?] remembers?

[INTERPOSING VOICES]

PROFESSOR: I think it was 17 in total.

AUDIENCE: Oh, but for--

PROFESSOR: Canada. For Canada, yeah. So 17 factories up there. And those go to how many DCs do they have in Canada? Someone remembers? More or less? 30? 40? 24. 24 DCs 24 DCs, and how many retailers? 1,000? How about 2,400? 2,400 retailers. So that's the network. 17 factories, 24 real distribution centers, 2,400 retailers. Thank you. Thank you for being brave.

Great. So, how would the IFO model look like? If I join an IFO, what will happen? So let me just do a little change to this so we can add more models. So we have a factory here. And this will go to our original distribution center, right? And then this goes to a bunch of different retailers. The same diagram so that we can just grow on this side.

So what happens if we decide to join an IFO model? If someone comes with an IFO model, what will happen at this point with the goods? Will I collect them at the customer site? So you think the industry, the IFO, what is a standard producer responsibility? So what does it mean? That I have to be collecting it or I have to keep options to dispose? What does the legislation say more or less, or at least the way it is described here?

AUDIENCE 1: Probably just that you're responsible for the ultimate disposal of the product.

PROFESSOR: It doesn't say that you have to go to your house and pick it up, right? It probably is not exactly the way it will work. The way it will work is that you will set up some sort of mechanism to get those goods back. And the ones that get back, you are

responsible for properly disposing them. And you have to create all the right information, materials, and incentives for the consumers to know where and how to dispose of these materials. It's like batteries.

AUDIENCE: However, with the size of stuff we're talking about, refrigerators, and whatnot, I think the only practical way to do it is to go get them for them. Maybe they have to call and make an appointment several weeks out.

PROFESSOR: Exactly. So it will not be Whirlpool in an IFO model. More or less, the way you will do it is that you will probably get the retailers or another network of dealers, probably. That's the way you will do it. That's the way it works probably today. You have a bunch of dealers here.

[WRITING ON CHALK BOARD]

PROFESSOR: And then these dealers are the ones that go to some sort of processor, some entity here that deals with steel, sorry that deals with decomposing the [INAUDIBLE] to get the raw materials. Out of the processors. That's more or less how the supply chain will look like if you do some sort of IFO model. Someone pointed out one of the things that you are missing out is that you are losing that connection with the consumer. That's why I wanted to draw the diagram.

So if you go to an IFO model, you will effectively remove your connection with the dealers. Maybe you wanted to do that on that network. Your consumer will not have that. Let's talk about practical reasons. Somebody mentioned this will cost some money to be able to collect those goods from the house of the consumer to the dealer. How will you recover this money? What happens today?

AUDIENCE: You charge an up-front dealer, and they buy the product.

PROFESSOR: That's exactly the way it works. All of us are paying for this, we just do not know. So when there is a [? realization ?] like this in Europe, or even batteries in North America, we are paid-- or bottles-- or any kind of mandated collection, we are being charged for it. We are-- it's not itemized. And then what happens? What happens with those dealers? Once you get them collected, the dealer says, I have a

Whirlpool here, and I take a picture of the Whirlpool, I scan it. I send it to Whirlpool, and Whirlpool gives me the money they collected so I can get back my cost. That's how you pay in these situations. So you don't go and charge the consumer for picking it up, but they say, well when you're done, call one of these authorized dealers' 1-800 number. We'll pick up for your appointment, and then the dealer goes and picks it up, and then the whole process continues.

That is probably the most common way that this actually is implemented in practice. So who bears the cost ultimately is the consumer. Which creates an interesting dilemma. If I'm charging by consumer, can I compete on the price I charge my consumer? I can charge less. This goes back to loyalty and other [INAUDIBLE] the customer. What do you think about the implementation of these programs? That is how maybe it starts making sense to try to get into it. Because if I can charge less for this, I can actually sell my product for less money, for a prospective consumer. Maybe. I can try to do that.

How will the network look like if I use my-- the close look now becomes apparent. What I will ask my consumers is, whenever you purchased the computer, we will take it back.

So I'm moving right now, so I have all these things that I buy for my new place. And I go to Ikea a lot this last weekend, I went a lot. More times than I wanted to go. And there's this big heart with open hands. Have you seen it? We'll take it back. So no matter when you buy, we will take it back.

So you could tell your customer the same. If you bought your refrigerator from Sears or from Kmart or from Walmart, and it's a Whirlpool refrigerator, don't worry. You can bring it back when you're done with it. And we will take it for you. And in that opportunity, I can also use that money to give you a new refrigerator. So that's the concept of also engaging the consumer, where you go to the same retailer where you purchased the goods and return that refrigerator, washer and dryer, et cetera, et cetera, et cetera. The question is, how do you get it back from the retailers to the rest of your network?

So one option is, which is what GENCO does, pretty much, is that you still keep that connection. But you can still have a separate network. You have another network that goes back here, where it goes back to some sort of collector where you aggregate some of these flows. And then you can get it back to a processing facility that can take care of it. This gives you the intimacy with the consumer without having to deal with the whole network. But in that case you will not get a cost advantage. You will have probably higher costs than the IFO model has, because you don't have enough volume. Where you get the most value is if you somehow use the same flow, so the same trucks that collect and deliver your goods to the retailer. Those are the same trucks you use. You don't have to create a new set of trucks.

[INTERPOSING VOICES]

PROFESSOR: They're coming empty anyway, so why not bring them back? Also their return volume is not as high, so it's not 100% of the sales. So what is the main bottleneck, then, for this to work? If you want to use your retailer and use your own trucks that come empty. Some problems we will find with this approach.

AUDIENCE: [INAUDIBLE] so why would I want to do it?

PROFESSOR: So that's a big problem. You are getting all this crap. I have to have it around in my warehouse, or in my floor space. I have to use a sales associate to try to spend time with the customer and make sure it is something I should take? Any Whirlpool? So that's the first barrier. What's the other barrier? That way you can fix, maybe you can give them some incentives.

AUDIENCE: Oracle did mention a systems barrier. They're not able to trace [INAUDIBLE] serial number levels, so we can figure out when these things are going to be coming back.

PROFESSOR: That's another thing. Which is the other one? Who has ever kept a box of the Whirlpool refrigerator? How do you move those things in a truck efficiently?

Luckily, things are very nicely packed. Not only because they're beautiful for you, but also easier to handle. Your palate can now go to the bottom, and put on top of

the palate. Things are not sticking out all over the place. The doors are not opened and closed. So just the packaging of this thing is meant to be moved.

Now once you return it, it's just an easier scale. So that creates equipment [? tear. ?] Eventually you have to have more labor to put it on top of the-- all those things are the things that made it a little more expensive. But you can come up with some solutions. Some standard wrapping or something.

But those are the operational constraints that you are probably getting. Once you get to face that problem, and you get to your RDC, you have the same problem that the retailer has. And that's you don't want to have all this crap in your DCE either.

So you have to have another area of your DCE so it doesn't interrupt the flow. So those are the operational constraints you have to face to set up your own network. And in some ways or another, that's what makes the IFO interesting. So even though the cost could be high, all those little barriers require some really strong collaboration with all your partners.

Your retailers need to be on board. You have to give them some incentives either on branding or market share, some sort of incentive for them to work with you. Otherwise why would they work with you?

And after that, you still have to work with all those physical barriers of actually moving used products back into where they need to be disposed. And those warehouses and DCEs are not available. You need more investments, even if they were huge capital investments. They are big barriers on operational investments.

And that's why companies like GENCO are very profitable. Because they still can deal with that complexity, and you don't have to think about it. In this case, Whirlpool has a big advantage. Market share-- 48% market share. So you have the scale that you need to work these details.

And if you can somehow include the value of the brand into this whole equation, that's where this becomes attractive. Operationally, it's a nightmare. It's very

upsetting to GENCO. Once you get a certain scale, like maybe Whirlpool has, that's where you can get into making worthy investments plus you get connection to the customer. Which I think is ultimately, just as a side note, what Whirlpool decided to do. Whirlpool, in this particular case, they actually decided to go towards a closed loop. But it was much more expensive than they thought. So it did not go that well for our manager. At least the first trial.

AUDIENCE: [INAUDIBLE] They're probably the first ones. Maybe they can become the IFO and everyone else. can pay them to do it.

PROFESSOR: And that's exactly what was the thinking. The thinking was, well maybe we could become the IFO. At the end of the day, the legislation says, we pick one organization to pick up everything. So if things are not working out, you could become the IFO. So Whirlpool, in this particular case, they did decide to try to close the loop. And they actually talked, well not in Canada, but in general, they talked widely about these things. About how they are taking things back and as part of their valuable position. And they believe this is going to give them some long term value.

All right, so that was kind of the underlying ripples. So this is the way-- the best data you can get was in this case study. You can get rough numbers of how much it cost. You have to look at other initiatives, the WEEE initiative. In different places of the world, they publish this kind of numbers, price of steel, price of copper, estimated number of units, and roughly going those.

The mapping of the costs here was a little bit harder. You need to have the inside information. That's why you use 10%. But this is how you probably can think through understanding what is the right trade off. That's always a good benchmark.

Try to compute how much it costs. Forward versus reverse. And that will give you a sense of what-- don't be surprised if it is twice as much, 30% as much, 40% more than your forward, because it's not optimized. And later it will become better.

Volume is here the key to do that.

And on homogeneous products like the case of Whirlpool, their boxes--
[INAUDIBLE] boxes-- makes it more viable. For a retailer, that's why their GENCO starts with. You have shirts and toys and cell phones. Everything in one bundle, then maybe collecting to your former supply chain is not as easy because the box is hard to fit in your truck. Boxes like these ones are easier.

All right, Any other thoughts or comments on the Whirlpool case? Tony or Alex, is there anything I should add? Great lecture? OK, great. Let's keep going.

So now I want to talk about the final projects. So I want each of you to come here in front and quickly tell the rest of the group what are you doing, which companies you picked, and that's what I ask for your [INAUDIBLE]

Did everyone find a nice clean green area in the [? work site ?] of your companies? With Alexis we joke, every time we look at companies, they all say it is eating our values, right? It's in our DNA. That's the word I use. It's in our DNA. So every single company and website [INAUDIBLE] the world should be a better place. So the other company is Indie Tech Zara.

OK, so I can tell you have lots of questions next class about how to compute carbon footprint of energy and stores, and electricity. I think that's going to be something to understand well because I'm sure all your companies have that highlighted somehow. So are they smoke and mirrors, or they're doing the real deal, I guess? We have to have to see after-- no pressure, Tony, but--

AUDIENCE: I might have more questions after

[LAUGHTER]

PROFESSOR: After the lecture. Great, so you know that's Zaragoza, our center is actually in the same logistics park as Zara, largest distribution center in Spain. So that's one reason why our partner center is in Zaragoza partly, co-located with the plaza that is the logistics activity zone of Zaragoza where the largest distribution center of Zara is. To manage all the global operations. They also fly things around from there.

OK great, thank you. So let's pick the next one. Any questions or comments before I move to the next group? No? All right. Let me see. So the next one is Hewlett Packard and Dell,

So thank you. I would like to just highlight these two projects. So we look at, first two pairs of companies have very different business models. Zara has one, fast fashion, lots of designs per year. Dell goes direct to consumer.

And I think that really has deep implications. And I think both of you highlighted that's important. I also want to point out, at least, the state of both industries in terms of environmental practices. Electronics industry has moved together for a longer time.

There's the WEEE directive in Europe. They put electronics under scrutiny, so they're both under higher pressure. That's why maybe you see more of the same initiatives like take materials out of certain kind. It's outlawed in some countries. So you have to do it because you have to do it. So there's a little bit of that on one end.

They also tend to collaborate in other sectors, both the apparel industry and the electronics industry. They collaborate on social issues on a parallel for labor. So that brings them together in other forums. In electronics, they also get together for technology designs to keep processors high speed.

So as you go into both of your cases, take a look at maybe there's some underlying themes that are common to the industry that have brought, because of the industry really. And the US consumer has no idea about these things, so for you it looks like every company is doing the same. But this probably comes from some other force. So in both cases, I know, especially electronics. [INAUDIBLE] apparel are more on that band width. So let's keep that in mind.

All right good, let me see who is next. BMW. So I think that this is interesting to know that the company that started the brand with the consumer-- hybrid notion-- is not the top rated company. You will imagine that where the largest emissions are in a car is in the usage. So if you innovated there, why are you number one for the next

25 years? But it looks like it's not.

So I think that it's interesting to know that. I also did not mention much about the life cycle aspect of it in both of these companies. It's very different and in textiles-- Tony, I don't remember in textiles or Alexis-- the life cycle emissions are not in use except if you consider water energy use for washing your clothes. That probably dwarfs the other emissions then. Do you remember, Tony? The life cycle emissions of apparel, in general, or in the tex--

AUDIENCE: Yeah, it's the wash, if it's the wash.

PROFESSOR: So don't wash your clothes if it's the--

AUDIENCE: High efficiency.

PROFESSOR: High efficiency-- no, don't wash them. Or use a solar washer.

AUDIENCE: [INAUDIBLE]

PROFESSOR: So this again goes back to the life cycle and which pieces you control versus you don't control of their life cycle. But great. Thank you. Let's look at the other group.

Phillip Morris International. OK thank you. I just want to add the comment on do you work internally in your operations or you do offsets? Plant trees, or-- we'll talk a little bit about that over time. But I'm glad that one of the companies here highlighted offsets as one of the strategies they wanted to pursue. Let me see. The other one is-- so I skipped.

So for our next class, the case studies [INAUDIBLE] is ready? The [INAUDIBLE] case study?

GUEST SPEAKER: It's been posted, it's pretty simple, so hopefully asking good questions about what you're actually the mechanics of doing calculations, et cetera, You can email me directly with those questions. But have that filled out and turned in by Wednesday morning because we'll-- I'm going to collect some of the data from that [INAUDIBLE] discuss it during class.

PROFESSOR: And you have to use the numbers for that one. There's no way to escape it. There's a bunch of sales questions you have to work on.

GUEST SPEAKER: It requires only basic multiplication [INAUDIBLE]

PROFESSOR: Thank you again.