

Transcript - Smart Retailing: Arrell Food Business and Technology Forum

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<https://youtu.be/eHIWd9spny0?t=381>

[0:00] (Music plays, welcome slide is visible)

[6:22] **Simon Somogyi:** Hello, everyone. My name is Dr. Simon Somogyi, I hold the Arrell Chair in the Business of Food at the University of Guelph and along with my colleague, Dr. Maria Corradini, who holds the Arrell Chair in Food Quality, also at the University of Guelph, welcome! To our inaugural Arrell Food Business and Technology Forum. The theme of our two-hour event today will be Smart Retailing in the food industry. And we have a great group of panelists from around the world, in industry, and in academia, who will be discussing the topics from the perspective of their work.

I would like to begin by, acknowledging the Indigenous Peoples who have lived and worked here. I am talking to you today from the ancestral lands of the Haudenosaunee and the treaty lands of the Mississaugas of the Credit. These are part of Turtle Island, covered by the Dish with One Spoon Treaty, that reminds us all to share the bounty of the land with one another. We pay our respects to the many First Nations, Métis, and Inuit people in Canada and abroad who work and learn with us here today.

This is the running of the forum that Maria and I have been planning for over a year. Back in 2019, we planned to have this event run face-to-face in a one-day format but, unfortunately, we know why that did not happen. We also hope to host this forum each year on a topic related to food business and technology over a one-day format. Hopefully, face to face. And hopefully in 2022. At the end of today, we are going to ask you to think of some topics that you might find interesting for our event, topics or themes you might interesting for our event in 2022. So hold on to that. Now, I will hand it over to Maria.

[8:30] **Maria Corradini:** Thank you Simon. Good afternoon, everyone. We would like to get an understanding of what industry you are joining us from. A question will come up in your screen, so please provide us some feedback on that. I will give you a couple of more seconds for everyone to respond. We should be getting the results quite soon. Perfect! Thank you very much for answering, we are glad to see a broad participation for different areas of our community. As I mentioned before, the topic is Smart Retailing, we would also like to get some feedback from you on what you know about this Smart Retailing. We are going to ask you to interact a little bit with us using the chat box and provide us with a word or phrase that comes to mind when you think about Smart Retailing.

[10:38] **Simon:** We will give everyone a second. We can see some coming through now.

Maria: I guess we are all in sync.

Simon: Fantastic.

[11:05] **Maria Corradini:** Fantastic answers. We are receiving very interesting answers in the chat. As some of you point out, smart retailing refers to the hybridization between traditional shopping methods and modern technologies. It requires an integration of multifaceted interfaces, through which consumers and business interact using advanced tools. Some of these technologies, we have seen already in the stores and it is clear and evident to us, such as, for example, self-checkout stations. Others, we are increasingly seeing them, or will see in the future, such as handheld or mobile applications during purchasing at the point-of-sale or interactive and digitized labelling. If we had to put it simply, Smart Retailing involves an interactive and technology -assisted shopping experience in a store, whose purpose is facilitating and enhancing the interface with the consumer. To reduce shopping and times, improve access to information, and increase the quality and safety of food that is accessible to us. Today, we are discussing some of the technologies, and their business application, including talking about their impact on consumers. Now, Simon, will be introducing our keynote speaker for today.

[12:25] **Simon Somogyi:** Thank you very much, Maria.

Firstly, we are very lucky to have Mr. Teemu Salmi talk with us today. Teemu is the chief information officer and head of digitization for Stora Enso, which is a bio-packaging and retail solution business headquartered in Finland, with subsidiaries in other parts of Europe, and also in Asia and South America. Teemu holds the accountability of the group level IT and digitization strategy of Stora Enso, while being accountable for the operational and IT service delivery of the business. Teemu was awarded the 2020 CIO of the year award in Finland for his accomplishments in leading the digital and IT transformation of Stora Enso, and before joining them, he had more than 18 years of senior and executive leadership experiences in variety of industries. His past experiences include executive senior leadership positions in the telecommunications industry, including sales and delivery and transformation of product and service business, and his most recent role prior to joining Stora Enso, Teemu was the senior vice president of IT and cloud in the Middle Eastern region, and in northeast Africa. Welcome Teemu and thanks for being involved.

[13:48] **Teemu Salmi:** Thank you so much, Simon. What an introduction! Not so often that you get such an excellent instruction. Good evening to all of you from sunny, nice Sweden today. We have a great evening here; it is not that often I have a speech after dinner. But today is one of those occasions, where that will happen. So, yes, thanks, Simon, for introducing myself and Stora Enso. Many of you might think: a forestry company, what does that have to do with smart retailing? I will try to give you an in-depth look into that of how it connects and then try to elaborate what we are doing within smart retail and the space.

(begins slideshow depicting images of food and packaging)

I see that we are getting the slides ready. While we were getting them ready, I do not think there is too much for to add to the introduction of myself than what Simon did. I will add one more thing though. Within Stora Enso, am also heading a business unit we call intelligent packaging. This is

where the connection comes in. This is a story that I will tell you about today. And, I have been with Stora Enso for four and a half years, and this capability and having the business unit for a year and a half in parallel to being CIO and having the digital agenda for the company. Let us see if we get the sites going and if we could please move on to the next slide. Let us see. Yes! We can actually move on one more. This was the introduction of myself which is already done. We are a company in transformation. We are a traditional paper company, that like 15 years ago, had 70% of revenue coming from the paper business. That is changed over the recent years. I will come back to that very shortly. First, I would like to show you a short film about our company and what we do in the space of innovation. Let us roll the film.

[15:56] (Video Plays: <https://www.youtube.com/watch?v=rUElPYaxgqs>)

[19:27] **Teemu Salmi:** Yes, so the renewable materials company, that is what we are calling ourselves. And of course, that is because everything that we do in our products comes from the tree. We truly believe that everything that is made from a fossil fuel today can be made for a tree tomorrow. I want to say that all the things you saw in the short film, they are not just dreams, we have all of these solutions already developed and we are scaling them up. As recent as yesterday, we have communicated a partnership with a bottling company that will stop -- start making bottles out of tree fiber, we are supplying that to them. This is truly happening, answering up to to all of these megatrends that we have in the world right now. As for Stora Enso, for you in North America, Canada, US, you may not know us so well, so let me give you a bit of a context. We are a €9 billion company, we employ some 2300 employees, very Eurocentric, and we have some production in Asia and China as well. We produce everything that can be made from a tree: paper, packaging, wood, houses from trees and construction materials from trees, and our sales is roughly 70% in Europe, 20% in Asia, 9% in North America, and the rest in South America. The North American market for us is growing, but it is still a fairly small market for us.

If we continue to the next slide please, I will talk more about our transformation journey. I said back in 2006 we were considered to be a paper company, some 70% of our sales came from paper, and we all know what is happening to the paper industry and what is happened the past or years due to the digitalization. We usually say thanks to digitization, but we say due to digitization that are business is changing. It is an industry in decline, over the past years. If you see our sales from to in paper, went from 2006-2018 went from 70% to 29% of our company revenue, and now unfortunately, the other month, we communicated that we will shut down yet another two paper mills. In 2022, we will have paper on a single-digit level, from a total revenue perspective. This has, of course, put an enormous pressure on our company to drive our transformation agenda and find new products and services to complement the loss of paper. Throughout this period, we have not lost revenue on top of that. We have been innovating new products and solutions, and we have the target of having 15% of our revenue coming from new products or solutions or services. Of course, you ask yourself, what is a new product or service? It is something that has not been in our income statements longer than three years. If it is older than four years, then it is old. You can see our development here, we are in the single digits so far but we are highly focused on having a growth of 15% of new service. Like I said, this has been driving our transformation agenda.

If you go to the next slide, please... I will talk about one particular problem, intelligent packaging. We started some five or six years ago thinking about how can we replace all of fossil-based materials in the world? If you look at one specific market that is very much plastic-based, is the RFID industry. RFID tags today are mainly made up of plastics and we found that we will now start innovating or finding solutions so that we can find RFID tags that are sustainable and made from sustainable materials. It took us two or three years to develop that product, and now we have been scaling up that product for the past 2 years that we have that segment, and our sales are actually growing very nicely stop. We have now come up with a sustainable alternative to the traditional plastic-based RFID tag market. With the RFID tag as a base, we also discussed how we can actually utilize the RFID technology to enable other business models, and then we were experimenting for a couple of years as well and we have found a very nice niche where we are seeing that there is not so much competition and quite poor technology development, and that is in the smaller retail segment. We came up with a solution called Selfly Store, and I will tell you a little bit about what that is. Our RFID technology development continues and we are launching new products as recently as a couple of weeks ago, we launched a new paper-based RFID tag the connection put into the microwave and it will cause no harm at all. Interesting to note, our RFID tags, they are biodegradable and recyclable. They are the only ones certified for that in the world.

If we continue to next slide, here you can see a snapshot from our production entity where we produce these RFID tags on paper rolls, were we actually print the antenna on the paper. If you click one more... You can see that it is a fairly small machinery and equipment you need to have in order to make these RFID tags. This production unit, we have developed in Finland in the city of (Name), where we have the capacity of producing over 700 million antennas per year.

If we go to the next slide, this is the traditional RFID tag to the left-hand side, you have six layers and a release liner made up of different plastic components. We have made it possible to take many of the layers out and only have a three-layer approach to our RFID tag, purely based on a paper with the printed antenna on top of it. It has a unique sustainability agenda, there is no other tag that is recyclable and biodegradable, and it has the same reliability performance and cost as the plastic-based RFID tags. Now, of course, many of the legislation is changing in many parts of the world, I can't talk so much about North America but in Europe, there is a single plastic ban coming into effect. This is also forcing industries to change, including the RFID industry. They are, we are well placed with our paper-based product.

If we go to the next slide, here we have it, why eco-RFID? No carbon footprint, no plastic use, clean and green manufacturing as I showed you, it is actually in a fairly small, only 50m² where we have our factory. It is recyclable, and is cost neutral for a pricing perspective, it is a reliable performance technology, a proven technology that is now being scaled up. If we go to the Selfly store and look at how we use the RFID model to enable other business models.

[27:56] I will tell you a bit about that. You know there are local trends happening now in retail markets, some of them actually viewed by the COVID situation and that is driving transformation even faster than before. Stores are becoming experience hubs; traditional stores have incorporated new concepts and technologies to provide better customer expenses to all customer groups. Retail

now is trying to leverage the power of data and also connecting all of the goods and items that are being sold. This has been going on in the fashion apparel industry already. Many apparel chains already have already connected their stores with RFID tags as paper hangers. That is been available for a long time already. Now, we see it happening in other industries where retail is now taking off. Micro-stores are now located at new locations, conveniently along customer existing journeys and footprints. We see small micro-markets starting up based on our technology, people are many times connected to smart and intelligent supply chain as well for the delivery of your, for instance, internet purchase into a smart box connected to the small retail shops. We see small, hub communities being built up in closer proximity to where people live. We don't think that the small solution will overtake the big, wholesale, but it will be a great complement with convenience close to where you live. Of course, offering a 24/7 ability to get what you need.

Our Selfly Store Solution is built up of many different components and I will take you quickly through what the technology looks like and how it work. In a nutshell, what the customer will see is this cabinet, this intelligent cabinet or fridge or cooler, whatever you want to call it. It is a nice, high end cooler with a screen on top of it, displaying all of the items that are available in the intelligent cooler with price as well. On top of the cooler, there is a payment reader, the consumer comes up to the intelligent cabinet, authenticates themselves with credit card, the door will unlock and you can open the door, and once the doors open you can take produce out and look at them, you can put back what you don't want to purchase. Whatever you have taken out, once you close the door, will be charged to your credit card. The intelligent cabinet will know what you've taken out because it will always take inventory of what is inside the cabinet once you close the door, and then we'll know what has disappeared since the door was open. The cabinet is radio isolated, so no radio signals can leak, so it is very foolproof from that perspective. All of the items in the cabin are tagged with RFID tags, sustainable RFID tags, that enables itemization in these cabinets. Of course, it looks good, it is a compact size and we all know that square meter price in retail is high. This is a way to get a very low cost, square metre price or square foot price, in your part of the world. Easy and fast purchasing, once this cabinet arrives to our customers, within 30 minutes you will be up and running in your business. It is a very fast transition from receiving the cabinet, you plug in the code, it will self-reboot and it will take minutes and it will be connected via a 4G connection and a router on top of the screen. All of the data management will happen in the cloud. The retailer will have full visibility of their stock, their full itemization, it can be displayed over the web if they want to a customer, and available in their smart stores at different locations, they can run campaigns on different coolers saying that you will have 50% of all Coca-Cola that you are selling, but you will not have that another part of the city so can you can do targeted sales thanks to the itemization and thanks to the data, that you will have the IUT enabled. That is another benefit for our customers, you can also use the screen for commercial ads while there is no customer wanting to buy something and when you aren't showing the product inside. You can sell commercial time on the screens as well.

So, if we go to the next slide... I have about five more minutes before we need to wrap up. The Selfly Store, in itself, is a cabinet that I just presented, then there is an e-commerce platform that the operator needs to know what to refill, when to refill, and how to plan their whole supply chain when they go the refilling route. They will be able to see which ones are the high sellers, where you have high sellers, what kind of high sellers but there low sellers and how to optimize the goods in your

store to maximize the sales and profit from each store. Then of course you have the RFID tags that enable this. In order to encode, you need to know, you need to tell the RFID tags what product they will be put on so that they know it is Coke when they put it in there, or Pepsi. You need to code all of the RFID tags, so a desktop encoding station is needed as well to code the RFID tags. Then, the operator who goes out in the field has everything in his cell phone, connected to the cloud as well, so all the refills will be done automatically, using the cell phone to unlock all of the cabinets, replenish the cabinets, close the door, and you will get the full inventory on your phone immediately and it will be uploaded to the cloud. Then we have support and service on the ground when and if needed. Then, of course, for software support, we have a software engineer in-house, in Finland, that actually does the software support for our customers. So if you go to the next slide please.

This is just a snip, a screen-print, of what the functionality looks like on the e-commerce platform. Like I said, there will be full visibility of your sales, your high runners, what items are selling and where and so on. Inventory management, sales report, you even get temperature report because many fresh food chains need to guarantee that you have the cooling chain that has not been broken, a cooling chain that has not been broken. You'll get the temperature report, it is monitored every minute. You can run the advertisements, and so on and so on. Finally, I would like to say that the data that we have in the cloud can be, of course, through standard APIS downloaded to your local – ERP local systems for our operators for customers to integrate the data into their own legacy platform.

[35:59] If we go to the next slide. We are coming to the end of the presentation here. Just to show you a little bit about the use cases that we have. To the far left here, you see one of our customers in Finland, that has opened a totally automated stores with our solution cabinets. They are now open in six stores, each shop has roughly to 8-10 cabinets. They have a dairy section, meat section, cheese section, soft drink section. It is kind of a normal store, but it is totally automated, available 24/7, and it is digitally managed. We said that concept picking up very quickly in Europe. In the middle top, we see another case, at the gate at the airport. Do you want to grab something quick before you board your plane? Another segment that is growing very nicely for us is leisure, you see on the top right. Typically, paddle or tennis centres, these centres have also realized that they can do renting of their paddle tennis rackets with our solution. We enabled the rackets with the RFID chip, you can pull it out and after you play you put it back in again. So, there is a rental solution as well. And, of course, hotels is something that we also see growing quite nicely. Replacing the mini bar that you have in the room, with maybe having a couple of cabinets in the corridor instead.

So if we continue to the next slide please, I think that we are stopped on time. I have 30 seconds according to my clock, left. I think it is time for questions. Simon, over to you.

[37:53] **Simon Somogyi:** Thank you very much Teemu. Very, very enlightening presentation. I have learned a lot. We are going to go into a period of question time. So, if you are in the audience, type some questions into the chat box in the bottom right-hand corner of the screen. We will try to get to as many of them as possible. In the next or 10-15 minutes or so. I will start the questions.

Teemu, you talked a lot about the transition of Stora Enso from a paper and wood bulk manufacturing company into a company focused on innovation, focused on product development, the examples of new packaging, RFID tags, the biodegradable, recyclable, and also these Selfly store which is a big departure. It sounds like there has been a massive investment in R&D in Stora Enso. Would you be able to share some of the ideas behind Stora Enso's R&D strategy and as a company?

[39:02] **Teemu Salmi:** I think in our industry, we are the company that spends most on R&D out of all our competitors. Let me take one practical example. How we work with digitalization. I think that is, when I started, we set sail on creating a process to how to drive digital innovation within the company. We are a traditional company, over 700 years old and we come from traditional manufacturing. How do you make sure that you enable a culture where you work fast innovation, where you are allowed to fail, and that is a good thing? So, we started something called a digi-fund. We set aside 10€ million every year for digital innovation. Anyone in the company, any one of our, employees can come with an idea and say "Hey, I want to test this." As long it is has new digital technology, has some kind of business value, and we have not tested it before, we usually grant the money to do a very fast proof of concept. Then, of course, we make sure that the person who is the initiator of the idea gets time to run this proof of concept through, and then we scale up when and if it is becoming something that we see is scalable and gives a good benefit on the company level. We have been running this for four years and we have over 100 ideas that we have materialized. Now, we are scaling up to 23 different solutions, across our factories and sales organization globally. You have to run it from a culture and leadership perspective, really make sure that you enable and set aside funding, competence, and make sure that people are supported to actually apply and work with innovation.

[40:59] **Simon Somogyi:** Thank you. Very interesting strategy. I think we will move over to some of the questions from the audience. I am just browsing through them now. Here we have one question that relates to Selfly Store, how do you prevent tampering with product if consumers can browse and return?

[41:22] **Teemu Salmi:** Right, well. First of all, for safety and hygienic reasons you cannot return a good. Once you close the door, whatever you have taken out you cannot put back in the door. Well, you can put it back, but you will not get the refund. The only way to get the refund is to call the service centre, and they will refund you if you have, a faulty product or whatever. And tampering, the RFID tags, they have an adhesive on them. You put them onto the product that you have in the cooler. Then, if you have to take the RFID off, since they are paper-based, they very easily, when you start tampering with them, they break. If you break it, the cooler will not recognize it anymore and it is a sold product. So, tampering for us has not been a major issue with this technology. It is proven very safe from that perspective.

[42:17] **Simon Somogyi:** Very interesting. We will go off to a little bit about the RFID tags that you mentioned here. So, as you probably know, RFID tags are used in livestock tracing, could there be a gate-to-gate or farm-to-fork opponent here for steak and other traceability applications for other food products?

[42:44] **Teemu Salmi:** Absolutely! If we just think about RFID as a technology, it is nothing new. It has been around since the seventies and eighties. And, you know, they are both passive and active RFIDs, we work with passive solution. We do not manufacture any active antennas, or tags, that we have to remember. The passive ones, they of course have to be activated by power somehow. Usually, when you send signals from readers, somewhere in a warehouse, or at the gate like you said. When you pass the gate, the reader sends a signal, and the antennas respond with the power that they get, right? Of course, active RFID's, they can be used, passive as well, in many use cases. For sure, there are RFID cases from food to fork. Exactly.

[43:44] **Simon Somogyi:** OK, I think we are, we are used to going to a department store and taking the tags, or someone walking out with the product and you can hear the alarm go off. But I think you mentioned that the traceability angle of what RFID can do, combined with, say, a recyclable and biodegradable angle rather than those big thick plastic things that we are used to.

So, obviously, it is Selfly, that sort of technology, it is a new type of thinking for many consumers who are used to going to a store and getting product off of shelves and then going to a checkout. Now that we are having to isolate a little bit, and, I can see that aspects of the chain are being taken, of the food supply chain are being taken out. Do you think that there is this future, this future idea of RFID and Selfly stories will require a new set of skills and mentality in society and the workforce?

[44:49] **Teemu Salmi:** I mean, we can just look at ourselves. Myself, I like convenience, right? I hate queueing. That is a waste of time, personally. Whatever can be made easier, faster, and better for me, and I can handle it when I want, when I have time, that would be a massive benefit for me. I would even pay a bit of extra for that. Instead of paying a dollar for a coke, I would pay 1.20 just because it is easy, I do not have to queue, and it is around the corner. These are welcome in today's society where we stress more and more, and we run therefrom -- run from one thing to another. You don't want to run to get to run to get to a shop that is closing. I think that has a lot of value to have one that is open all the time. Like I said in the presentation, our solution is not competing with the wholesale, they will still have the big chains in the world where you go to the department source, you go in and you do your weekly grocery shopping, whatever you do. This compliments that. You do the additional purposes -- purchases, doing your weekly whatever. Grocery shopping that you do.

[46:08] **Simon Somogyi:** I do not think that we are going to see the death of grocery stores.

[46:11] **Teemu Salmi:** Absolutely not! And by no means is this even trying to do that. This is like I said a complement to that. We see it is really taking off, at least in Europe. I have to say that I am not so educated about Canada and the US, about the situation there. But, Europe, this is really taking off.

[46:30] **Simon Somogyi:** It seems to me that particularly in remote and rural areas in large countries like Canada, as long as there is a 4G connection and stable logistics, you could get product into those stores, the Selfly stores, and they will obviously all the traceability that goes with that as well. And I'm going to follow that with another question about the Selfly store. You talked about RFID, and the purchasing process for the consumer, but also that the traceability that we have been able to track temperature, and other types of product information. But the consumer is paying with their credit

card, or some other type of smart phone. Is it possible to then collect information about the consumer and their preferences and frequency of purchase? Those types of things?

[47:20] **Teemu Salmi:** This is a privacy question more than a technology question to me. Right? Technology wise, all transactions are there. They are saved. It is all up to what you are legally allowed to do from a privacy perspective, you know, tracing people's behaviours and personal transactions. Technology is not the hinder there, obviously we need to handle. The cloud needs to handle it so that you get the right debit for the right purchase that you have made. The data is there. But then, I think it is more a legislative than a product technical perspective in my perspective. Can I maybe add one thing? You mentioned a very important thing about the rural part. We have rural parts in the Nordic countries as well, and something that we are developing is container-based shopping. We create containers that are movable, and transferable, you can use them, either in rural areas, you can use them in festivals, or some kind of, as a movable shop. That is also a concept that is now gaining traction. I just wanted to mention it because you talked about the rural space.

[48:31] **Simon Somogyi:** Definitely. I think you mentioned that there is a convenience aspect, an aspect of the product for rural communities, where is hard to get stores, full-size stores. But, following on from that, I am looking at some of the questions here about food retailing world-wide. And in implementing this type of Selfly, fully digitized concept. Amazon Fresh, come to mind. Are there other companies that you can see that are sort of taking this on as part of their future strategies?

[49:07] **Teemu Salmi:** Yes. It is still new. It is still very new. I have to say that I have not been in retail so long myself. For me, it is a new industry as well. But I was a bit amazed about the kind of lacking technology development in the retail. You do have automatic checkout stores, or tills, that is very new. The technology development and other industries has gone way, way, faster. Robots for paper production, we've had for forty or fifty years. I was amazed at how little technical development there has been in this area. So, I think the retail chains are now considering, we see that in our discussions with them, and the ones that pick up are usually start-ups. They say, based off of no legacy, they say this is a cool idea. We are now going to set up a solution for food at work. And then they get money, they get funding, and they go massive, right? That picks up quite well, the big chains, maybe they are too well-off today. The innovation period is not always there. But we do get traction. We have a bit of chains in th Nordics that want to try out solution and are piloting already.

[50:34] **Simon Somogyi:** Thank you, Teemu, I will end off with one final question. You talked about Selfly and biodegradable RFID tags, what will be the Selfly 2.0, or your RFID 2.0? What is coming in the future?

[50:56] **Teemu Salmi:** First of all, I think there is something that needs to be innovative, even though we are printing using this method with the antenna. This is a challenge for all of us, I am not an engineer, but how can we still make the tags even more sustainable? Using less metal, but how do we make communication work without metal? Think about that, I am eager to listen and to keep innovating on that topic. That is something I would like to continue to work with. Now we have taking away the bulk of our RFID tag, but at the end of the day it is about the chip and the antenna that needs to get the signal to activate the chip and send back the content on the chip to the reader.

That is how we create intelligence. That is something we should continue to innovate on, not an easy one, that's it for sure.

[51:56] **Simon Somogyi:** We will look out for that in the future. I want to thank you very much, Teemu, for your time and particular considering that it is your evening in Stockholm.

[52:08] **Teemu Salmi:** Twenty passed eight now, yes.

[52:12] **Simon Somogyi:** We'll let you go. Thank you for joining us today in our forum, we look forward to talking soon.

[52:19] **Teemu Salmi:** Thank you very much and have a great rest the day.

[52:24] **Simon Somogyi:** So, with that, I hope Teemu's discussion was interesting, I know I found it enlightening. We will now move on to our next panelist, and I will head over to Maria. Take away, Maria.

[52:41] **Maria Corradini:** Thank you so much Simon, thank you for all the questions. The great presentation from Teemu and the feedback you provided in the chat including target marketing, consumer focus, knowing your consumer, big data calls good attention provided evidence that smart retailing requires a concerted use of different technologies, to effectively interact with the consumer and acquire shared data to ensure adoption. Therefore, in the remaining part of this form, we will hear from three exceptional experts that have been working on several aspects of this challenge. I will briefly present them. They will provide a short presentation on their topics of expertise, and once presentations are over, we will open the floor to the audience again for questions using the Q&A tool. We will try to get to as many as possible. Among our experts, we will have Dr Lili He from the University of Massachusetts Amherst, Dr Kimberly Thomas-Francois and Harumi Urata Thompson.

I will start first with Dr Lili He, she is an associate Professor Food Science at the University of Massachusetts Amherst, and the part of the IR facility as well. She has resumed -- received numerous grants and awards including Institute of Food Technologists Samuel Cate Prescott Award for Research, and she was selected for and was selected as one of the Talented 12 by Chemistry and Engineering News by the American Chemical Society where she was dubbed the contaminant catcher because no food contaminant could go undetected by her. Her research centres on surface-enhanced Raman scattering based techniques for food safety and other applications. In short, Lily can make your food tell you its secrets with minimal sampling and disruption, a convenient feature for smart retailing. She is going to share some of her research with us now.

[55:13] [PP Slide 1] **Dr. Lili He:** Good afternoon, everyone! Thanks for the introduction, Maria, I am happy to be invited to give this short talk here. I am an analytical chemist; I had no idea about smart retailing until Maria introduced the concept to me and made me ready to think about what kind of techniques I am using right now that could be potentially used for the future of Smart Retailing.

[55:45] [PP slide 2] **Dr. Lili He:** In my lab, we mostly use these three techniques. Reimann, infrared and XRF. For my own research, I am moments still use these microscopic types of machines for the contaminants analysis, and their behaviour analyses. We do have some small in the handheld instruments, and I think it would be fit for the Smart Retailing application.

[56:19] [PP slide 3] **Dr. Lili He:** First, I want to introduce Raman spectroscopy. It uses a laser light to shoot at a sample, it is non-destructive and non-invasive post. Most of the light will be scattered with not much information, but there is a very small portion of the light which will interact with the sample and provide you with a fingerprint kind of information. Each different sample will give a different fingerprint. Instrumental-wise, it could be as big as a benchtop instrument or as small as the size of your hand. Potentially, it could be put in the store like a price checking device. Traditional applications of Raman spectroscopy including the factory, which would be for example receiving the ingredient, you can check the spectrum to verify it is the material you want to see. It can be used in quality control by matching the spectrum with the quality of the food. Or in the RMD department, with the molecule change under processing conditions. Smart Retailing, while consumers can shoot out a laser and get a spectrum, what do consumers really want to know? Do they want to know the identity of the food, or do they want to know if it is really all of oil? Or do they want to learn more about the quality of the product? This really depends on what the consumer wants, but the more analytical challenge is the amount of food in the packaging. How can we get use for information -- useful information when the food is side of the package is a challenge?

[58:35] [PP slide 4] **Dr. Lili He:** This challenge can be solved by spatially offset Raman spectroscopy. Traditionally, the point of the laser and the detector is the same spot. In this case, you are getting most of the packaging information but if you place a detector away from the laser spot, you will be able to get information of your food underneath the packaging material.

[59:06] [PP slide 5] **Dr. Lili He:** This is not our data, this is from another research group. where they show how to detect sugars under this packaging material. However, another limitation for Ramen spectroscopy is if the signal is quite weak. Pretty much, you can only get information from bulk materials like sugars you can get information from sugars, but if the consumer wants to know the contaminant pesticide, which is usually in very low concentration, normally Raman cannot get you information about pesticide.

[1:00:15] [PP slide 6] **Dr. Lili He:** Then, you need to use surface-enhanced Raman spectroscopy which can add on the nano substrate so that it can go in the store and be used to find nano particle and the patterns, the nano particle coding the fibers. These nano substrates can enhance a signal tremendously, leading to the detection of pesticides.

[1:00:33] [PP slide 7] **Dr. Lili He:** With our work, you can develop more than one single approach. We can swab the Apple surface with nanoparticles and shoot the laser at the spot for a pesticide, or we can directly add the nanoparticles on the surface where we are also able to generate this kind of a fingerprint. Again, a different fingerprint means different molecules, so by establishing a database ahead of time, we will be able to know what type of pesticide it is. Based on stomach capacity, we can

establish a quantitative curve to find out how much is there. The hurdle is, you need to add nanoparticles, which we don't expect the consumer to do that sample preparation at a store.

[1:01:15] [PP slide 8] **Dr. Lili He** A step further in this study, a nano coated fiber can be embedded into the packaging material. The nano particle coated fiber can absorb the chemicals vital information and store in the space inside of the packaging. This information will change, the pattern will change, depending on how many days it is stored. That means we can establish a model to predict the remaining shelf life. We have a validation study to show that is very accurate.

[1:02:01] [PP slide 9] **Dr. Lili He:** Another technique, X-Ray Fluorescence spectroscopy, similarly is another known is where we use the x-ray shooter the sample and you get a fingerprint information of mineral profile. For the Raman, fingerprinting of molecules. For XRF, it is fingerprinting the mineral. Here, we have a small study with ginseng samples we got samples from Wisconsin and from other countries, based on assumptions that the soil and fertilizer use in different locations will impact the mineral profile of the final ginseng product. That can be used for application in authenticity and traceability.

[1:02:56] [PP slide 10] **Dr. Lili He:** Another snapshot of our project is developing a chemically modified chip. This chip cannot only capture bacteria, but also enhances visibility under a low magnification microscope. Including a smart phone-based adapter. This is still very early, we are still far away from this in smart retailing because it involves some sample preparation, it may be more suitable for the factory or at home testing.

[1:03:31] [PP slide 11] **Dr. Lili He:** Overall, I can see Smart Retailing is really an integration a variety of effort. So as an analytical chemist, my role is the sensor, the area of sensor development. I really want the information coming from the consumer perspective to guide us; what kind of information we really want to know so that we can develop the techniques to better meet their requirement for the future of Smart Retailing. Thank you very much.

[1:04:12] **Maria Corradini:** Thank you so much, Lily. I am glad to know and inspired to think about other applications [of smart retailing], despite the amazing amount that you have presented to us today in a snapshot. So, we are going to move on to hear from Doctor Kimberly Thomas-François, who is currently a postdoctoral research fellow at the Lang School of Business and Economics at the University of Guelph . Kimberly has been engaged in research work in management, for supply and value chains, with attention to customer engagement, service leadership, governance, and entrepreneurship. Kimberly is currently the (indiscernible) on (indiscernible) and a smart food retailer. In her presentation, she will tell us about this research.

[1:05:11] [New PP slide 1 & 2] **Kimberly Thomas-Francois:** Thank you, Maria, for your introduction. It is indeed a pleasure Thank you so much for this opportunity to present the work that I have been doing over the last few years. I am also very privileged to have worked with Doctor Simon Somogyi, who is the Arrell Chair of Business and the Business of Food, and he is also a professor at the School of Hospitality and Tourism Management. With the recent funding of the SSHRC grant, we have also

been able to engage highly qualified personnel and person of Alireza Zolfaghari, who has been able to do some great research work with us as we have continued to observe this phenomenon.

[1:06:05] [PP slide 3] **Kimberley Thomas-Francois:** Pre-COVID-19, when we started this research, we observed in the literature that consumers uptake of smart and virtual retailing, or digital food access was very slow. We also observed in the industry that it was so in Canada, and we were able to launch a representative sample of over 1060 research participants. They also indicated; the survey indicated that only 12% of Canadians were actually virtually shopping for food. We looked over to our neighbours in US, and the phenomena was the same. Even though it is almost a \$500 billion grocery industry, we realized that statistics were showing that only 2% of US consumers were shopping online: virtually, or using smart forms of retailing. Meanwhile, in China, there was actually a proliferation, and I imagine it is still the case, developing, develop and driven mostly by Ali Baba fresh vegetables. They are actually using multiple options, hybrid options, of smart retailing, going into the store and interacting with the technology in the store. The technology it is really integrated into the consumer life.

[1:07:43] [PP slide 4] **Kimberley Thomas-Francois:** During COVID-19, we were very excited to look into what is happening because we anticipated a change in the attitudes and proliferation of use in smart and virtual grocery shopping. However, in our survey we realized that while there was a 49% increase in virtual grocery shopping, which is naturally so because of risk aversion, and an increase in intention to use by most consumers, consumers were basically still going to the grocery store. They were going to the grocery store, probably three times a week as the statistics show and they would purchase some items online. So, we also conducted experiments, a hypothetical experiment in the survey where we give the consumers \$100, it asks them to spend this money to see exactly what choices they are going to choose in purchasing their food, and they reverted to shopping in store, \$74 was actually the average.

[1:08:57] [PP slide 5] **Kimberley Thomas-Francois:** We realized that there is a lot going on with consumers that we cannot understand it and the current literature does not explain it. We really need to be able to know how in the world are we going to see this rapid adoption of digital technology in food. (Laughs) We looked into the literature, and one of the theoretical frameworks that is popularly in the news is the Technological Acceptance Model. Also known as TAM. However, as we observe it and critiqued by the literature, it does not look into some of the social influences. Obviously there is something else to observe with consumers. We decided to, because that is the framework that we had at the time, we presented an extended model of TAM. We started to conduct research. Meanwhile, we also came up with a conceptual paper, where we tried to think through what is it? That is causing this? A cultural factor? Cultural change? What is it? What are these influences? These attachments that consumers have two food, while they are willing to shop for groceries and jewelry, and apparel, all of these other things online, they somehow are very reserved for shopping for food online.

[1:10:27] [PP slide 6] **Kimberley Thomas-Francois:** Let us look at some definitions because you will hear me using virtual and smart and retailing at the same time. We define *virtual grocery shopping* as the purchase of food or personal items via a food retail companies internet-based portal or application with delivery at the consumer's home or designation or in-store pickup. Whereas *Smart Retailing* is,

the phenomenon where the consumers are actually purchasing these items in store, however, they are doing so without direction, assistance, or interference from employees at the store, rather, computerized information points, which is also like self-checkout and of course mobile checkout as well, As we heard earlier with Teemu, with RFID and other AI technologies.

[1:11:26] [PP slide 7] **Kimberley Thomas-Francois:** So, we decided to pursue to see how, who are these consumers, and if we can understand a lot more about them. Who are these consumers that are in the Canadian market and what other perceptions towards smart and virtual retailing? We were able to measure or segmented them based on their attitudes and the intention to adopt smart and virtual retailing. We were able to find that they are four categories or segments of consumers. The *enthusiasts*, the star at the top; they actually had extremely high attitudes towards smart grocery shopping and also extremely high intention. The *potential* on the other hand, which represent the majority of the representative population, 40%, they had above average high intention, as well as high attitudes towards smart grocery shopping. There was a very unique group of consumers, or as we described them as the *fence sitters*, they actually had high attitudes towards, 'oh yes, this is good' but they had very low intentions to adopt. Are we just able to do the things or are we doing it? And of course, the *traditionalist* of this, they had low attitudes and also low intention.

[1:12:59] [PP slide 8] **Kimberley Thomas-Francois:** The most widely dispersed type of smart retailing in Canada is actually self-checkout, we tried to use it as a marker to determining how these consumers in the different segments behaving when it comes to self-checkout. So, we were able to find on average, the enthusiast goes to the store, they would shop 50% of the times using the self-checkout machine. The potentials were just under that at 46%, while, the fence sitters, 37% of the time and the traditionalists, it had to be something really urgent so they were at 31%. So, the characters that were describing in these segments, actually validate and help us to understand more about them.

[1:13:57] [PP slide 9] **Kimberley Thomas-Francois:** Just some more insights on who these segments are. We noticed that enthusiasts are extremely high -- highly educated and they have college-level, graduate-level, and above of education while this was much less the case for the traditionalists. The enthusiast, lots of them, 74% of them, they actually resided in the urban core, and the suburbia and the larger cities. The traditionalists as well but in less percentage. We also noticed that 53.5 % of the enthusiasts had higher income levels above \$50 thousand dollars and over, and much less so for the traditionalists. The other very interesting finding was that the largest group of consumers who were considered enthusiasts were actually between the ages of 35 and 44 years old. While the potentials of 25-35years old. This is very exciting, it says that we are actually going to see some higher acceptance rates of adoption in the future because, this is our generation to come, much less so of the fence sitters and the traditionalists. We also noted that these enthusiasts, and potentials, were also married people, most of them were married people. It is suspected that they needed convenience and they are actually very time poor.

[1:15:37] [PP slide 10] **Kimberley Thomas-Francois:** Using a multipart analysis structural equation modelling, we were able to visualize all four groups to see how they respond and how they were different. This model here, it only shows the general modelling for all groups of consumers. What I

would like to point out here, that we found, which really tells us that there is a lot more and that we need to study, is that the technology being easy to use does not drive intention. It does not drive a certain behaviour. Even if the consumer is technologically savvy, they are also not going to do it if they do not want to. These two parts were not statistically significant, while the other parts were. So it just showed that there is a lot more to do in the area.

[1:16:32] [PP slide 11] **Kimberley Thomas-Francois:** For practical implications, we can see that consumer attitudes towards smart food retailing has the strongest impact on adoption, and it is supported by the literature on attitudes, however we noticed that in the fence sitters, that is not the case. Fence sitters are motivated more by convenience, so, retailers will have to show how convenient it is and really convince fence sitters of the convenient option that it is. The model that we use also shows that there is a state of readiness to adopt smart grocery shopping in the Canadian market of different groups, though different groups have distinct behavioural patterns. The other thing that is interesting to note, is that there is a need to have those platforms existing, alternative platforms, as Teemu was saying earlier, you need, it is complementary. Even if consumers are using the approach already do the research online, then they go in store and buy. Then at least you have some presence, and you have the opportunity to capture as many consumers as you would like. The other thing that we also noticed that consumers are really in for convenience, and they are looking to save time, increased access to purchases food and they are also looking for transactional ease. Finally, that social factors, it is indeed the sweet spot for the future research. And, it is a major reason for adoption. We were able to prove that, and so, much of our future research is looking into developing that cultural change acceptance and trying to see how we can do some further investigation on the subject matter.

[1:18:42] [PP slide 12] **Kimberley Thomas-Francois:** Just a bit of advice for the retailers if you are going to target the market, I would say go with the enthusiasts, based on the research findings, and of course the potentials. Enthusiast who are only 23% of the population, by using statistical inferences and potentials are actually 40%. That is over 60% of the population who are getting ready to adopt these autonomous forms of grocery shopping.

[1:19:17] [PP slide 13] **Kimberley Thomas-Francois:** And, I would say thank you at this point and turn it over to Maria.

[1:19:23] **Maria Corradini:** Thank you so much, Kimberly, for that presentation. It's always nice to box yourself into a category, I was not surprised (Laughs) to see that I was an enthusiast.

[1:19:37] **Kimberly Thomas-Francois:** (laughs) no surprise.

[1:19:38] **Maria Corradini:** No surprise. I get excited about many things and apparently new technologies is not an exception. We are going to come back to you with some questions, and I'm going to introduce Harumi Urata-Thompson. She is the founder and CEO of HUT Consulting, she specializes in leading and advising innovative paths to achieve, strategic, operational and marketing success in the business on different subjects including artificial intelligence, blockchain, cryptocurrency, cyber security and diversity and inclusion. Harumi has held several senior and

executive positions in healthcare, science, and finance. Particularly new to her ability to reach technical and operational requirements within organizations, and we are happy to have her to give a very short presentation followed by questions.

[1:20:38] [New PP slide 1] Harumi Urata-Thompson: Thank you, Maria, and thank you for the whole institution to invite me to this event. Food is definitely one of the sciences and I don't necessarily get to talk about the technologies which has a position in the food industry, so I was really excited to think about what aspect of technologies that are related to food that I can bring to today's presentation. I was going back and forth and this was a really exciting event so thank you very much again for this introduction. As I was introduced, my name is Harumi Urata Thompson, and we are going to be talking about how the emerging technologies specifically can really help the food and food industry in general.

[1:20:34] [PP slide 2] Harumi Urata-Thompson: if you want to go to the next slide, the first couple of slides are very generic ones, Maria just gave me a very extensive introduction, so I think we can skip the slide and go to the next one.

[1:21:41] [PP slide 3] Hurami Urata-Thompson: There are only two things that I want to talk about today, as part of the presentation. I want to make it as digestible as possible, because the moment we start getting into the nitty-gritty of technology, it gets too technical and then we start moving away from the real principle of the reason of why we're talking about it, how it helps us. Just to give you my background, in addition to what I do today, I actually started out as studying business as my undergrad and I went to business school. I started out as a traditional investment banker; I was in the front office for a number of years before switching to technology. I am one of those people who really thinks that, because I have experienced the industry first before I moved into the field of technology, I can speak to finance to technology, if that makes sense. That was the beginning of me realizing what technology can do and how it can change our lives or support our lives.

[1:22:51] [PP slide 4] Hurami Urata-Thompson: If we go will go to the next slide, I will talk about data first and blockchain. There are a lot of different things that artificial intelligence can do. What it is, really, is that there is a lot of data that we have collected, not just in the digital era but from the moment that the planet was born and people began to think of how the past can change our future. Whatever data we have, we unknowingly have been processing it for the advancement of our lives and to make our way of connecting business more efficiently. AI, as technology, is nothing more than a helper to make sure that we can process that kind of data in a more efficient way.

[1:22:55] [PP Slide 4 continued] Hurami Urata-Thompson: Let's talk about some examples and how some of these things can help the food industry. I know we all know about image recognition; we see this pixel stuff on the TV, news, on the computer, every day. How does that help us and how can it help the food industry? For example, how'd do we select food? When we have food, we look at it and say, "This looks good enough, so we will put it into this batch" or "this looks small, we will put into this batch". What if there is a machine that you can use to sort food? And then can say "well this is small, this is big, this is slightly out of shape from what we want, so we will put it in a different batch". There is some of this we are doing, but this is no more than image recognition which our eyes

do, you have outsourced it to technology and that is with the technologies are really adopting. What our eyes can do, machines can do a little faster.

[1:25:01] [PP Slide 4 continued] Hurami Urata-Thompson: How about market driven big data analysis? We say these things it is a mouthful of what we do, but all these years, when the food company comes out with a new snack or new ways to process food, or new kinds of ways to freeze food, or to package it and sell it to us through supermarkets, for example. We always have some test market, and we are always collecting data. "In this market, it did fairly well so we will try it nationwide.". What if we could collect that data from the past, not directly coming out of the new product that you want to come out, but you haven't come out with a similar snap in the past. How well did it do? How well did it do in this particular season, how well did it do in this version? What marketing was paired with the launch of this kind of food? All this information you already have, and this kind of market-driven big data is gathering to see if we can apply it to the new product that you want to establish in the market. Again, the marketing department and other departments used to do this, with or without knowing about these things. Pattern recognition, this is an interesting one and it is obviously about some of the patterns we have seen in the past. Something we can think of is the weather pattern, when the weather has behaved this way the previous year, next year the harvest has become like this. All of this kind of stuff, because we have the artificial intelligence and processing massive amounts of data, and doesn't necessarily forget some of the instances that we may forget [as human] when we are analysing a massive amount of data. Things like this can really help us with agricultural business, which is directly food related. Sensors to build in efficiency, this is precisely when we are talking about in our keynote speech. We actually have a sensor to know what has been taken and what needs to be added. That really adds the efficiency to the logistics and to the supply chain all that kind of stuff. Portfolio analysis, what do you do when you're analysing a lot of different types of supermarkets, you can start saying in this kind of demographic or in this kind of region when you have a portfolio, let's say supermarkets, when you have this kind of ethnicity people living nearby, what kinds of things do we need to do to stock the supermarket with? Of course the supermarket will always have a certain lineup of everything, but what kind of collections might do the best? Because it has the ability to do this kind of analysis, it can. Again, only because artificial intelligence are for big data, we can do. We have always done that from the experience or with the limited amount of data that we, as human beings, are able to process on the spreadsheet. We used to do all this kind of stuff, but because artificial intelligence is breaking down big data all over the world, we can do it more efficiently and we can process much bigger data a little bit easier. These are some of the examples where the data and artificial intelligence can help our lives every day. When it comes to food and it doesn't just have to be food, anything on a day-to-day basis.

[1:29:00] [PP slide 5] Hurami Urata-Thompson: I'm going to talk a little about distributed ledger technology. I will tell you why this is relevant for the food industry, but first of all, we very casually say distributed ledger technology and blockchain, what about other chains that are out there? First of all, what is it? When this concept first began to come up, I did not know what it was. I went to the internet, which is another great technology we can always leverage on a day-to-day basis, to look up what it was. There are variations of these explanations, but basically, the technological infrastructure and protocols that allow simultaneous access, validation, and record updating in an immutable manner across a network that spread across multiple entities or locations. When I first saw this

explanation and read multiple explanations, I basically said, "I will never understand this, this blockchain this distributive ledger technology. What am I going to do with it I do not understand it and couldn't really care less.". But then when somebody explained it to me in this way, I found it really helpful. I pasted this picture here for everyone's visual effect, on the right, or sorry, on the left is where we have been traditionally connecting to the central database. Think of each one of our computers or each one of our offices connecting to the central database. It is pretty much sort of a one direction connection. The central database will then speak back the data to you. What the distributed ledger technology did is eliminated the big, expensive, dark room where you often see it like in Mission impossible or something where they penetrate into the big data centre to steal certain important things, that big expensive data centre has been eliminated from the system. Each computer is connecting to each other. So effectively, we have one master spreadsheet that everybody, as one person updates the data in one spreadsheet, everybody gets pretty much simultaneous updates. Think of this like sharing a Google sheet or something. A Google database spreadsheet that is shared simultaneously by a lot of different people, it gets the update and it is very difficult to make a change, there is no one person who can make a change without having notice because that gets reported immediately. Everybody knows what you or somebody else did in terms of giving an update.

This is really what distributive ledger technology is all about, it is a very modern way of keeping spreadsheet database. You eliminated the central location to host that, in the process of getting to this technology. How does this help us in the food industry? I do have a couple of examples I would like to talk about. Because I'm in the fin-tech industry right now, I will use the fin-tech example, but it is not the most efficient way of how this is how distributed technology helps us. One of the first, if not the first way the blockchain was used, the distributive ledger technology was used the food industry was with oranges out of Florida. When the shipped oranges out of Florida, the use blockchain to pay that orange price. That is one of the first ways blockchain technology was used, the process payment was the same but the receipt of the money has been communicated through the blockchain. Where I think technology of this nature really shows its power, and I'm sure some of you have heard about already, is when you really need to track each shipment of spinach or in one of those vegetables through the exact kind of data line. If there is a batch of bad food that is found at the end of the retail supply chain, what do you do? You don't know how much more impact the shipment has. You might toss the whole container or whole shipment. If you can track it back exactly where the shipment comes from, and where that batch came from, you can eliminate that small portion of the food. You don't have to waste any more food than necessary. That kind of tracking back to the exact source is what distributor ledger technology allows. I think distributed technologies real power is in that supply chain, tracking the logistics, and things like that. I would love to see more use of it in the food industry. I am coming to the main presentation itself. If you would like to chat further, I will put my contact information. I'm done with my presentation part and I will turn it over to Maria. Thank you.

[1:35:15] Maria Corradini: Thank you so much Harumi. All three speakers made a wonderful job sharing a lot of information about their expertise. I was particularly happy to see the example of weather forecasting, that was one of my first research projects. Bringing weather forecasting data analysis into microbial contamination for testing, of foods. So, thank you so much. The three of us, for stealing all your expertise in 10 minutes. I think that you did an amazing job. I think that now we can move to some questions from the audience. I will start by asking one question to each of you,

as the questions keep on trickling in. For Lili, you showed us the spectral data, many people will not find that easy to understand. What do you think are the major hurdles for the consumer to properly make sense of these data and how can we help them to overcome those hurdles?

[1:36:34] **Dr Lili He:** That is a great question. I do not think that the consumers need it to understand the spectral data. I think that there will be a black box where everything will be output directly, very simple and straightforward information.

[1:36:54] **Maria Corradini:** I think that you can create that sort of reach for them. Now, instead of having the spectral data, or the complex visualization, you just have it on go or no-go, or something like that.

[1:37:16] **Maria Corradini:** I think that we lost Lily. Let's move to Kim. We have a really nice question from the audience about using the smart retailer. So, do you think that you can get pertinent information about demographics of online shopping and that the elderly are a particularly interesting part of this segment? I know that they are mentioning that it is a large group, they could benefit from a Smart Retailing, and also of course online ordering if it is affordable. So, do you have any data on that? Do you have any data between the correlation of this Smart Retailing, online shopping, and elderly demographics?

[1:38:17] **Dr. Kimberley Thomas-Francois:** What we have been able to find, and it is also found by previous research. That, there are some situations -- situational factors that encourage, factors that would encourage shoppers to shop online. That includes the elderly. From qualitative research that we have done and cited one of the respondents, one of the respondents, she said, that her parents for years have been using grocery from Longos supermarkets. It was more catered to them. They actually struggled to set up, enlarge the infrastructure so that they can get at the COVID-19 rush. They were also servicing that group for quite a while. Providing the groceries. We have not seen elderly very active in a smart retail, most of them, we see in the research, they fall within the transition list segment of the group. -- Traditionalist But when they have these unique situations where they cannot go to the supermarket, these situational factors, they do rely on a smart, virtual retail. That is shopping online. And they have been active participants in the market.

[1:39:56] **Maria Corradini:** I think that a wonderful contribution of your research is having that, so now you have the strategies in order to relate from one group to the other.

[1:40:01] **Dr Kimberley Thomas-Francois:** The other interesting thing is that, now retailers have the opportunity to cater to these groups and, they can cater to situational factors because they come with pregnancy, families having large families, and it allows grocery stores to target these specific groups based on what they are looking for, and actually have them use the various options for smart and digitalized access of food.

[1:40:40] **Maria Corradini:** We have plenty of questions from the audience. I am going to move to the questions from the audience for Harumi. Can you provide other examples of how Blockchain technology can be applied to supply chain issues common in food manufacturing?

[1:40:56] **Harumi Urata-Thompson:** Absolutely. Another thing that I was thinking about as I was reading that question is, for example, I will just use fair trade coffee. We as consumers, we have to take it for granted when the coffee shops, or the market is telling you that these are fair trade coffee, we really have no way of knowing that. But what if somebody actually comes out with a project where you can actually track from the barcode or something, that will actually tell you that this coffee comes from a very small family in, I do not know, XYZ country in South America and we guarantee, because this product is made by the certain party who has nothing to do with all these big suppliers. So, those things are... tracking is one of the expertise, or the real sort of couple things that Blockchain technology can do. Any place where you really want to know the truth, if suppliers, it is telling me the truth. Or, if we can actually trace it back to the source. Whenever that kind of question creeps into your mind, that is when I think things like Blockchain can really help you. Because, that is going to be, it is a mutable truth that is coming through the system. So, that would be one example that comes to my mind.

[1:42:27] **Maria Corradini:** Exactly. I think that authenticity shows the ability to track is something that is going to keep on having a much more predominance for the use of distributive ledgers. So, Lily, this is a fantastic question in my opinion. The audience wants to know if governments are adopting technologies to identify food fraud and mislabelling, and what are the limitations in order to do that and make it feasible?

[1:43:00] **Dr. Lili He:** Yes. The short answer is yes. (Laughs) So, yes, I do see it coming more from FDA or government regulations. Seeking, for those portable, handheld, device based technologies to do a quick, authenticity of mislabelling tests. As a limitation, is depending on the, the adulteration degree. Often times, if it is 100% mislabelled and adulterated, it very easy to detect if you have an established database. If its adulterated at a certain percentage, that really relies on the sensitivity of the instrument and measured being used.

[1:43:52] **Maria Corradini:** Finding that balance is something that every researcher strives for. Cheap, good, accurate, trying to keep all those things is quite a challenge and all of us are working on that. So... yes. In terms of the retailers, what do you think is the major hurdle that they face in order to incorporate the technologies that we have discussed and the ones that are coming forward into the daily operations?

[1:44:28] **Dr. Kimberley Thomas-Francois:** One of the main challenges with the smart and virtual retailing, and I think it answers why it is so slow in progress. It is a -- it is very capital-intensive. It would also require new skills, and new skill sets in workers, etc. Retailers are recognizing that it is important to have the options for convenience, and to make sure that they keep every possible dollar coming in, because the margins in grocery stores are actually pretty slim, 3-2% margins. They have to manage and balance it, customer service, giving them all the best, of all conveniences, for the various segments of consumers. So, from the consumer perspective, that is a major barrier; the investment that is required.

[1:45:33] **Maria Corradini:** Thank you. Harumi, when it comes to the use of AI, and some of the audience wants to know if now we can monitor and inform food systems interactively, if these systems can be done self-learning that would allow us to purchase better, access better food, and maintain a better food supply?

[1:46:02] **Harumi Urata:** Absolutely. This is a part of what somebody, especially the marketing people, call social listening. There are, now, amazing sources of grassroots information if you will that are out there. That are constantly talking about if this is a new product that is amazing, you should try it. Or, I heard not such a good thing about this particular place or this particular sort of vegetables. Or, have you tried this new kind of not-meat meat? All of these things can be read or listen for that matter. That's why I was pointing to my ear while I was saying read. It can be consumed by the artificial intelligence, and kind of digested so by the time the information reaches us, if you are using one of those products, that does social listing and kind of message data. Whether or not you trust it, because, there might be a lot of noises that are going through the system. So you have to use your own judgement. But there are a lot of artificial intelligence technologies and products out there that are kind of collecting these kind of inputs from the market. Like I said, you have to figure out what the noises are that are put in, because there are some people who are deliberate at putting a bomb into the social media site and website. There might be some who are compromising certain sites, and so on. The people who create that kind of product have to be aware of the ways to eliminate these noises, or also on the user side to take it with a grain of salt or lack of a better word. All these things are needed, but, there was a time when we did not have time to process that information again. We do have mechanics to do it. And, we have a way to read them. Absolutely we do. Issue is going to be on the user side if there is any kind of problem.

[1:48:04] **Maria Corradini:** Yeah I can imagine we are receiving a lot of this data (indiscernible) difficult to see from. New mining approach might help in order to do that efficiently and that will get us there. So Lili, can you explain a little bit the role of non-invasive reporting on quality and informing decisions of the supply chain. Do you think it is easy to translate these kinds of information into, for example, changing the price of a food dynamically? Or, modifying the distribution, the distribution order of things and the logistics attached to distribution of foods as Harumi has presented? Do you think that this is feasible or are there still a ways to go in order to get the spectral data?

[1:49:10] **Dr. Lili He:** That is a very good question. At the grocery stores, we always notice when the product is close to the expiry date we get a discount. So from the store perspective, if stores knows accurately what the remaining shelf life of products are actually are, that would help with the dynamic pricing. That, I think would be a good application. For the others, and I said there are still very early in the development because so much needs to be considered as a big hurdle for Smart Retailing, but we should be able to provide the more information on the product quality, safety, identity, to the consumers and also, it depends on what exact kind of information the consumer wants. Right if they want this kind of information we can definitely develop the types of information for that kind of need.

[1:50:16] **Maria Corradini:** Thank you. Kim, to what extent are factors at play, like getting out of the house and seeing people, and seeing and touching food to determine quality, affects the process of this kind of technology?

[1:50:32] **Dr. Kimberly Thomas-Francois:** Come on, we have all been through COVID and I think we all can admit that going to the supermarket, whether we have interacted with other consumers or not, it was a social event. Obviously, it does play a role in consumers somewhat rejecting the technology. Also, we have found that consumers will want to touch and make sure that this is a product that they want, they want to taste, even. They want to feel certain products, especially the perishable products. What we suspected, although we did not pick up specifically that that is the purpose of them going into the store to get perishable products, they were actually going ... we suspect they have been going into the store just to pick up the produce even though they were buying some packaged items online, they were going to pick up the fresh produce in store. I think I lost my other train of thought that I wanted to add. But obviously, these factors and I don't know how we are going to get past it, because consumers complain of ordering products and not getting what they actually ordered, or the quality of the products they got. The products may have been replaced, because the one that they ordered was not available, so they have been very unhappy. It gives that level of control to be able to pick up exactly what you're looking for.

[1:52:24] **Maria Corradini:** That's also a perfect segue because the next question from the audience is about COVID. They would like to know, and is a question for the three of us, how these trends will be affected by the pandemic and if there is going to be a speed up post COVID, or if COVID is a non-issue for any of these trends and technologies you are proposing. And if these trends are going to be similar in Canada, other G8 countries and other regions. I don't know if Harumi wants to start with this?

[1:53:03] **Harumi Urata-Thompson:** Sure, and I say absolutely. It's going to accelerate. I will use the cliché phrase that has been used many times in the past, which is necessity is the mother of invention. As we got to this unprecedented lockdown, and the economy is opening backup we are still back home. A lot of us are not just adjusting to food, but every industry, we are all forced to do things a little bit differently from before. What if you cannot go to a supermarket? Then the people who cannot touch the internet a meaningful way are forced to do online shopping to make sure that they have the supplies coming. That brings a lot of different challenges. If you're stepping out it supplies every day, what you need to do? If that was something, to get the food going, let's see if you are using something that does not naturally come to home. What do you do? All that necessity would only accelerate the use of different things, and I don't think any of us took the time a thousand years ago to get out of the way to do things just from nature, that's not reality. The next place we can go is how can we use what we think we have today, and then improve it or go to slightly different direction? I'm not giving a specific example because nothing comes to mind immediately, other than a lot more people are forced to do online shopping. I will not necessarily say it is an improvement, but it is a change of life. I think that happens far and worldwide. So absolutely 100% yes to this question for me.

[1:55:01] **Maria Corradini:** Thank you, Harumi. What about you, Lili?

[1:55:06] **Dr. Lili He:** Definitely, I see a change of because of the COVID to everything including the shopping and doing research. Moving online is placing another hurdle for these techniques to be in place because we target it at the consumers who use it at the store, like a price checking machine, but if you're doing it online, it is not possible to do that. That puts in place and opportunity for grassroots store manager of whatever, factory transportation, from that point of view that they may apply these techniques to get more information to supply good quality and safe food to the consumers.

[1:56:10] **Maria Corradini:** Fantastic, so basically you see it as sensational to the retailer instead of than to the consumer. Kim, any final words about COVID?

[1:56:14] **Dr. Kimberly Thomas-Francois:** Absolutely! As we see changes in the population that are more favourable to these ways of the new modalities, they are younger, so they are also preparing for it. We have to look into new construct, new theoretical framework, digital readiness and also looking at the consumer's appeal and what exactly is going to appeal to them. Do they have any affection to this mode of shopping? We do expect that the marketers are also predicting that the trend will be almost a fully digitalized word, especially with 5G coming into play.

[1:57:11] **Maria Corradini:** Thank you so much. I would like to thank the three panelists, and Teemu as well, for their presentations that they provided us. As well as all the thoughtful answers to our questions. I would like to pass now to Simon, I would also like to address him and thank the audience for their participation and particularly, Sujani and the Arrells who are joining us for this event as well. We hope that next year is going to be in person. Simon, why don't you wrap this up?

[1:57:49] **Simon Somogyi:** Thank you, Maria. There we have it. Two hours has almost flown by very quickly. First of all, I would like to thank everyone for their involvement today, Teemu, Lily, Kimberly, Harumi. All of you who have been listening today, I have learned a lot about innovations in packaging and retailing, I know what ramen spectrality is about and how it impacts food safety, the importance of AI, and traceability in the system. How we need to work and understand consumers a little bit better to make these innovations a marketplace reality. I think we have a lot of work to do and it has been an interesting two hours. Hopefully, it has been interesting for you as well.

As Maria mentioned, and as we said the beginning, we want to host this type of event in the future. We would prefer to do it face-to-face, I think we would all agree, being able to talk to people and being the same room is a little bit better but a little bit different as well. Better than staring at a computer screen. We are in the process of deciding the topic for our next forum, we would like this to happen on annual basis, probably around this time of the year. I will give you an opportunity in our chat box to maybe put some ideas that you have, you don't have to do it right away, but we can collect those ideas for some topics for next year. If you want to write them down, we would be appreciative of that. In any case, keep a lookout for an email later this year or early 2022, for hopefully our first face-to-face Arrell Food Business and Technology Forum. As Maria mentioned, I would also like to recognize Tony and Laura Arrell . who are from the Arrell family foundation who are our very important benefactors and are with us today. Thank you, Tony and Laura, for joining us.

Two people I would like to point out, Muriel O'Doherty and Jessie-Anna Loewen who have been working on the logistics, without those people we really wouldn't be where we are today. Everything is gone very smoothly. Some of you have asked about the slide deck or the recording, this event has been recorded so we are looking at posting the recording on the Arrell Food Institute website. Keep a lookout for that. With that, Maria, I think we would both like to say thank you very much for taking the time away from work and family, and we look forward to seeing you all very very soon.

[2:00:47] **Maria Corradini:** Thank you so much, we hope to see you next year.

[2:00:51] **Simon Somogyi:** Goodbye!