

A System Thinking Approach towards Single-Use Plastics Reduction in Food Delivery Business in Thailand

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Table S1: Stakeholders and interview questions.

Stakeholders	Interview Questions
1. Food Delivery Platforms	<ul style="list-style-type: none"> - What are the company's measures to support the reduction of SUPs packaging in the delivery business (if any)? - What has been/ will be done to improve the 'opt-in' measure at both consumer and merchant ends? - Comments, suggestions, and expectation towards the Memorandum of Understanding (MOU) signed among 15 agencies in August 2020 to reduce SUPs waste from food delivery. - Is there any promotion/ incentive for the merchant partners who want to take part in SUPs packaging reduction effort? - What has been/ will be communicated to the public, merchant partners, drivers, and other relevant parties regarding SUP packaging issues? - Where in the system should be improved the most with the goal to reduce SUP packaging? - What kind of support from the government is needed to achieve SUPs reduction in the system?
2. Food Retailers	<ul style="list-style-type: none"> - What types of packaging are used? What are packaging components in one order? - Is there any measure at your retail to support the reduction of SUPs packaging in the delivery orders? - What are the challenges in reducing SUP in the food delivery sector? - What are the guidelines towards 'no cutlery' orders? - Where in the system should be improved the most with the goal to reduce SUP packaging?
3. Civil Society Organizations	<ul style="list-style-type: none"> - What are the challenges in operating sustainable niches? - What kinds of messages about plastic waste do you communicate to which group of audience? - What are your expectations towards each actor in the system? - Where in the system should be improved the most with the goal to reduce SUP packaging?
4. Policy-Level Agencies	<ul style="list-style-type: none"> - What should be the role and responsibility of the business sector in being a change-maker? - What roles could the government and civil society play in order to overcome structural limitations? - What are the most important SUP waste management policies that should be a priority? - Where in the system should be improved the most with the goal to reduce SUP packaging?

Table S2: Coding of the interview results.

Interview Topics	Stakeholders			
	Policy-Level Actors	Food Delivery Platforms	Restaurant Partners	Civil Society Organizations
1. Sustainability in Business	<ul style="list-style-type: none"> - The current business responsibility scheme is voluntary - Policymakers need to know the capacity and limitations of every stakeholder first - Active cooperation from the restaurants is required - Expect to see more responsibility projects resume after COVID-19 situation - Businesses can stop using SUPs that are unnecessary or ones that have practical alternatives - Business sector needs to be responsible for what they produce - Business sector is expected to actively engage, communicate, and provide options to its customers. Commercial incentives will not only build loyalty and satisfaction but also can lead to behavioural change. 	<ul style="list-style-type: none"> - Not only environmental responsibility. The companies extend their responsibility to societal justice and welfare aspects especially during the pandemic and economic downturn - Profit-led company. Every party is willing to change if the change can be translated into monetary gains. - Multi-stakeholder. Platform alone cannot absorb every cost of every initiative. The restaurant and consumers directly influence the market while platform facilitates and encourages sustainable choices - Previous sustainable efforts failed. Food handling without plastic bag during the pandemic is impossible. Cutlery charge did not work well. Platform subsidy was not sustained. - Incentive alignment. If every party satisfies with the benefits received, any initiative can be carried on under the market system without any intervention 	<ul style="list-style-type: none"> - When packaging leads to an impression. Damaged products are not worth trading off with less packaging - Receive complaints at the beginning about food spilled due to poor packaging - Choose packaging that is better (and look better) for the environment - Incentive for Bring-Your-Own. Offering a discount for customers who bring their own container is a win-win strategy - Green packaging is very welcomed if the cost stream remains the same - Active green restaurants with their own initiative. Some restaurants create their own in-app packaging options for customers - Green communication is a key to preventing customer dissatisfaction - The attitude towards SUP packaging varies across restaurant types 	<ul style="list-style-type: none"> - Packaging becomes valuable. Packaging as a service. - Flexibility is a key for niches to move closer to a sustainable transition model - Product and service as a communication channel - Niches communication strategies: inside-out and outside-in. Niches' role in the system has been increasingly highlighted - Deliver impressive user experiences to provoke pro-environmental behavior

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2.1 Initiatives review 1: No Cutlery default	<ul style="list-style-type: none"> - Opt-in, opt-out should be clear. - Anything related to customer usage experience should be optional - Platforms and the government should communicate to the restaurant about the opt-in system in order to limit unwanted SUP cutlery. - Restaurants' service mindset needs to be re-communicated. 	<ul style="list-style-type: none"> - Technically easy, requires less resources and effort - practical limitations as the restaurant often ignores the request. - Platform regularly communicates this issue to the restaurants. - Customer feedback can help the platforms and restaurants to adjust their policy - Platforms evaluate its partner restaurants on food quality, hygiene, order accuracy, preparation time and staff training, but not on how much plastics are used 	<ul style="list-style-type: none"> - This initiative can reduce cost but also poses risk for customer complaints. - See more notes about customers not wanting cutlery and condiments. 	<ul style="list-style-type: none"> - In order to see a significant impact, charges for cutlery should be considered - Require less effort, save cost, and a high chance of success
2.2 Initiatives review 2: Packaging Procurement	<ul style="list-style-type: none"> - Should have options for consumers, especially when they need to pay more - As long as the price of environmentally friendly products is higher, the chance of success is low. - Some packaging does not have alternatives. 	<ul style="list-style-type: none"> - Platform procurement and subsidy alone cannot sustain the program and long-term incentive is not yet available. - Government subsidy at the macro level is needed - Willingness to pay for alternative packaging at individual level, both the consumer and the restaurants, are vary 	<ul style="list-style-type: none"> - The restaurants are not aware of platforms' green packaging discount campaigns. Maybe the platforms need more marketing and promotions. - Still a price barrier. - Never receive complaints about not using eco-packaging. 	<ul style="list-style-type: none"> - Platform subsidies are designed to be voluntary. Eco packaging should be optional for consumers if they need to pay more. - Should be coupled with the labelling program - Only value-added restaurants would opt for eco-packaging
2.3 Initiatives review 3: Labelling	<ul style="list-style-type: none"> - Can be done easily - Platform supports green restaurants 	<ul style="list-style-type: none"> - May have a low impact. - Adding labels will only cause an overloaded information. 	<ul style="list-style-type: none"> - If the incentives are profitable enough, the restaurants would join the campaign more. 	<ul style="list-style-type: none"> - Easy to do but will not change minds or behavior - Platforms should consider

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Program	<ul style="list-style-type: none"> - The key is how to make the restaurants opt for greener packaging because labelling alone is not enough to influence the restaurant decision - It is scalable but takes time 	<ul style="list-style-type: none"> - Adding eco-label will lessen the visibility of other labels 	<ul style="list-style-type: none"> - Interesting because consumers seem to care more about SUP packaging. 	<ul style="list-style-type: none"> - giving out discounts for customers who engage in this program
2.4 Initiatives review 4: Deposit-return Scheme	<ul style="list-style-type: none"> - Reuse system during COVID-19 is challenging - High cost and may be applicable to limited areas - Take-back system and EPR should be mandatory - Only some SUPs packaging can be returned - Hygienic issues need to be cautiously addressed 	<ul style="list-style-type: none"> - Nearly impossible - Consumption behavior of the Thais is still based on convenience factors - The size of participants may not be lucrative enough for a company to invest - Very operational heavy. adding another round for pick-up is not economically viable - Setting up drop point facilities is not enough - The market needs an efficient central waste management system and infrastructure that supports this reuse scheme 	<ul style="list-style-type: none"> - Only causes delay and complications. Both restaurant and customer want fast and convenient service. - The outer bags can be returned. Most of the time they are in good condition. 	<ul style="list-style-type: none"> - Platforms cannot find this model profitable - Platform can gain loyalty and customer retention through this model - Platform as a system driver. Having platforms as the intermediaries, it can overcome the limitation of the scattered restaurants - Norms need to be established. Normalizing the system takes time as it requires societal change - The ideal concept is no extra km to do - Need to validated hygiene concept

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3. Environmental Governance	<ul style="list-style-type: none"> - Government agencies need to work together in integration - Improve the current tax incentive scheme - Seriously enforce a tax disincentive scheme. Environmental costs of SUP should be internalized - Government should regulate standards on eco-labelling - Government can develop policies and measures that tackle every stage in the system - Setting up mutual understanding and communicating to all stakeholders - Economic measures, law and regulations to support the stakeholders' sustainable initiatives across the downstream, middle stream and upstream of the supply chain 	<ul style="list-style-type: none"> - Mutual direction as a guideline for platforms and restaurants to follow - Post-consumption waste management system will make business models and individual consumption behavior adjusted accordingly - Clear packaging regulation - MOU is a good start, but we need more than that - Government subsidies could help tackle the structural problem especially during the economic downturns. The subsidy of alternative packaging at the initial stage can create demand - Only intervention from the government can sustain the greener market system 	<ul style="list-style-type: none"> - Government needs to have clear and solid practices for us (the restaurants) to conform. - Government should promote alternative packaging through a pricing mechanism. Costs of alternative packaging should be lower. - Government should develop an effective waste management system. 	<ul style="list-style-type: none"> - Promote mono-material packaging for ease of post-consumption management - Government should set a framework for every stakeholder to follow - Promote environmental awareness and understanding among the government sectors - Government should support all sustainable actions with knowhow, communication, and regulation
4. System Analysis	<ul style="list-style-type: none"> - Digital economy and urbanization are among the key drivers of unsustainable consumption. It produces a lazy-economy and convenience-based lifestyle - Hard and soft policies need to 	<ul style="list-style-type: none"> - Contribution from every stakeholder is needed. While packaging suppliers, platforms, and restaurants absorb additional cost of alternative packaging or reduce unnecessary packaging, Consumers also must put more effort into 	<ul style="list-style-type: none"> - Cost minimization principle of small-size restaurants - Restaurant branding and positioning matters - Platforms' social responsibility can be spilled over to their restaurant partners. 	<ul style="list-style-type: none"> - In order to adopt greener packaging, the system needs to shift from industrial suppliers where there are only few producers to local suppliers that use local materials

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	<p>complement one another</p> <ul style="list-style-type: none"> - Tax and non-tax incentives are what the government can offer at this time - Awareness and behavioral change need to be coupled with supportive infrastructure - Consider new players in the market. - Raise awareness in the long term, provide incentives along the way, and introduce regulations - Platforms' monetary measures can be compulsorily applied - Incentives as marketing and behavioral nudging 	<p>rejecting unwanted plastics and post-consumption responsibility</p> <ul style="list-style-type: none"> - The restaurants can be the real changemakers. They are the decision maker regarding packaging choice. - Demand-led sustainable packaging transition. Alternative packaging should be promoted and supported to create initial demand which will then accelerate supply and lower the price according to the rule of economics. - Cost and profit are the key. Any intervention anywhere in the system that can lift the economy of the business, whether it is to drive the sales or lower the cost 	<ul style="list-style-type: none"> - Currently, the restaurants feel that they have not received enough solid support from the platforms. 	<ul style="list-style-type: none"> - Disrupt the system even if the structure is unchanged. While the government slowly implements its policies and measures, sustainable niches can disrupt the system with technologies. - Bottom-up approach works. Starts from individual voice - Customers are willing and ready to support responsible business when incentives are offered - Platform companies are also willing and ready to change if considerable incentives are offered - Eco-packaging suppliers can act as promoters in the system - The ideal role of niches is to disrupt the system by making the restaurants benefit with low investment and system cost - Key is to make alternative packaging cheaper. Involve tax and non-tax incentives.

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5. Limitations to Sustainable Consumption	<ul style="list-style-type: none"> - The existing system does not lean towards circularity but rather linear - Reduce alone is not possible in this capitalized economy. What remains necessary should be well-managed 	<ul style="list-style-type: none"> - Willingness to Pay gap of both the restaurants and the customers - Awareness gap across individuals. System, infrastructure, measures, and regulations need to be improved in parallel - There is no practical alternative. The 'reduce' and 'replace' may not be the best solution. We should also focus on 'recycling' - Lack of regulation on green production and consumption - Voluntary measures will not take us anywhere 	<ul style="list-style-type: none"> - Some green packaging is not practical - Communication and differences in concern level - High price sensitivity. Charging more is the last thing to do - BYO policies cannot be applied to most of these scenarios. 	<ul style="list-style-type: none"> - We cannot make every stakeholder understand and engage in Thailand's waste management system - Inefficient waste management systems limit behavioral change - Demand-driven to gain economies of scale for eco-packaging. - The pandemic delayed the promotion of zero waste behavior - When sustainable consumption is not aligned with human's convenience-based intuition. New mindset needs to be implanted - Mandatory responsibility for individual waste management. If every individual is required to be responsible for his/her own waste, the consumption decision will be more conscious