



*Limiting
Plastic Pollution*

Learning Experiences From Islamabad and
the Relevance of EU Policies for Pakistan



Acknowledgement

This study was prepared on behalf of the EU SWITCH-Asia Sustainable Consumption and Production Facility (SCP Facility), under the supervision of Cosima Stahr and Dr. Arab Hoballah, by experts Dr. Saima Shafique and Tom Clark.



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List of Abbreviations

AJK	Azad Jammu & Kashmir
ALR	Average Loss Rates
CGPI	Clean Green Pakistan Index
CHP Plants	Combined heat and power recovery plants
CSO	Civil Society Organisation
DC	District Council
EC	European Commission
EEA	European Environment Agency
EU	European Union
EPA	Environmental Protection Agency
EPR	Extended producer responsibility
FMCG	Fast-Moving Consumer Goods
IBR	Incineration Bottom Ash
ICT	Islamabad Capital Territory
INGO	International Non-governmental Organisation
KPK	Khyber Pakhtunkhwa
MoCC	Ministry of Climate Change
NGO	Non-governmental Organisation
PKR	Pakistani Rupee
Pak-EPA	Pakistan Environmental Protection Agency
PET	Polyethylene Terephthalate
PoM	Placed on Market
PPE	Personal Protective Equipment
PPMA	Pakistan Plastic Manufacturers Association
PRO	Producer Responsibility Organisation
PSQCA	Pakistan Standard and Quality Control Authority
RDF	Refuse Derived Fuel
SMEs	Small and Medium Enterprises
SRO	Statutory Regulatory Order
WMC	Waste Management Company
WSSC	Water and Sanitation Service Company
ToRs	Terms of Reference

Introduction to the publication by the SWITCH-Asia SCP Facility

This publication is the result of a years-long cooperation on Waste Management in Pakistan in the context of SCP (Sustainable Consumption and Production) between the EU and Pakistan as part of EU's SWITCH-Asia programme from March 2020 until May 2021.

Coordinated by the SWITCH-Asia SCP Facility, two experts, Dr. Saima Shafique and Mr Tom Clark, conducted the analyses and gave recommendations to the government of Pakistan. Their recommendations are also linked to several aspects of the National Action Plan on SDG 12 SCP, which was prepared with support from the EU.

Plastic production, its consumption patterns, and its growth trajectory are unsustainable. A systemic shift to circularity is required to reduce environmental, human health and climate impacts. Activities that have been proven effective for other materials with detrimental side effects need to be adapted to this industry – combining national commitments and visible change simultaneously for consumers and producers.

SWITCH-Asia has worked on the topic of plastics in multiple ways. SWITCH-Asia grant projects have provided innovative recycling technologies as well as material alternatives to plastics, and have also sought to promote changes in consumer behaviour.

The SWITCH-Asia SCP Facility has advised Asian governments with a focus on analysing their unique situation, bringing together the issue's stakeholders, and developing policy recommendations.

This publication seeks to present two distinct perspectives on curbing plastics pollution for Pakistan:

1. The first part focuses on providing insights on various stakeholder perspectives regarding a recent ban on single-use plastic bags in Islamabad;
2. The second part analyses EU policy frameworks and national European implementation experiences, as well as their applicability in Pakistan.

Based on these analyses, the experts gave recommendations for limiting the growth trajectory of plastics in Pakistan. These were presented to the government at a workshop in May 2021.

Introduction to the publication by the experts

Plastic waste remains a major global challenge, and is a dynamically growing waste form in Pakistan, leading to severely negative impacts on the environment and human health. Clearly, recycling is one option but not a simple panacea for the plastic problem. Many forms of plastic waste are inherently difficult or impossible to recycle. A global ecological catastrophe is looming, where the cost of waste is not borne by industry but by the environment and societies. Current legislative frameworks and environmental directives are not sufficient to minimise the hugely detrimental environmental and health impacts that are built into the current, linear plastics system.

A more holistic circular-economy approach is needed, applying incentives where possible, and bans or other regulatory controls where necessary to protect the environment and human health.

Regional and national strategies like the EU Plastics Strategy are required. At the same time, given that plastics is a globalised material, it is important that states coordinate on this issue. The negotiations for a Global Agreement on Plastics Pollution, initiated at the United Nations Environment Assembly in February / March 2022, is a first step in this direction.

Meanwhile, it is important to look at the local level, and learn from implementation experiences. Our interviews and consultations with stakeholders in Islamabad regarding the single-use plastic bags ban has demonstrated that for many stakeholders, plastic waste's negative impacts were not at all clear. This awareness needs to be raised at all levels and for all stakeholder groups if the plastics challenge is to be confronted holistically. At the same time, the majority of survey respondents who were aware of the negative impacts recommended a ban of single-use plastics altogether. This shows that consumers are willing to change and show a greater openness for change than their often-cited preference for "convenience" might suggest.

Our work in Pakistan has shown that a multitude of activities is needed to curb plastics pollution. These include the following:

1. Raising awareness of the public and all sectors involved on plastic pollution to encourage a shift in perception regarding plastics as a harmful and potentially toxic material.
2. A holistic waste management strategy with waste segregation at source for maximum plastic recovery.
3. Policy measures for prioritised waste streams like market restrictions on certain plastics, improved design and marking to easily track and recycle, and making producers responsible for their products after use.

It is also important to deal with current plastic litter on land and in water bodies. Massive clean-up drives should be incentivised to collect waste plastic. Collected waste should be recycled with the help of the existing formal and informal sectors, engaging upstream industry. This will open up the opportunity for formalising the informal sector, and also for waste treatment and innovative SMEs to grow, thereby strengthening the recycling infrastructure and alternatives to plastics.

Overview of plastics status in Pakistan

Plastic pollution is a significant problem in Pakistan. The country is not a key world producer of plastic (in 2016 it produced 431,000 tonnes vs. 381 million tonnes globally) but, after imports, is a significant user. Pakistan generates more than 3.3 million tonnes of plastic waste each year [1]. Its plastic industry is experiencing a high growth rate with the production capacity reaching 624,200 tonnes in 2019. However, Pakistan possesses a narrow petrochemical base, producing a limited number of polymers including Polystyrene (PS), Polyvinyl Chloride (PVC) and Polyethylene Terephthalate (PET). Therefore, the country imports 100% of its Polyethylene (PE) and Polypropylene (PP). The imported plastic is mostly used to make single-use bottles, plastic bags, and packaging. Plastic imports saw a sharp (24.5%) increase in just the first ten months of 2021.

Most of the plastic waste is disposed of in open dumps and water bodies. A study conducted in 2017 showed that the river Indus (which runs down the length of Pakistan) is the second largest contributor of plastic pollution (bottles and bags, as well as microscopic fibres and beads) in the world's oceans [2]. Therefore, plastic management and not its production is the key problem in Pakistan. If business as usual continues, projections indicate that by 2025 Pakistan will contribute 1.7% to global mismanaged plastic [3].

Waste plastic bags, particularly, are a pollution problem. Pakistan consumes an estimated 55 billion to over 112 billion single-use bags a year, and there is little to no management of their disposal. To curb plastic pollution, Pakistan joined 128 countries in banning one or more single-use plastic items by imposing a ban in the Federal capital, Islamabad, on 14 August 2019. The success of the ban relied on awareness of the ban, access to cheap alternatives, but more importantly it required policing to fine the violators. The Ministry of Climate Change (MoCC) catered for all three challenges to make it a success to be copied by all other provinces.

While this ban will help control the single-use plastic bag pollution generated in one part of the country, there is still the need for robust and innovative plastic waste management approaches to tackle other kinds of plastic pollution.

As in many other countries, Pakistan is also faced with the unfortunate situation where the plastics industry is refusing to accept environmental legislation. The industry, comprised of nearly 8,000 units, argues that recycling instead of a ban is the way to go. The plastics industry contributes almost 130 billion Rupees annually to the national exchequer by paying taxes, customs and import taxes. According to the Pakistan Plastic Manufacturers Association (PPMA), nearly 300,000 families will be affected with the immediate ban on plastic bags because of the unemployment it will bring as the production units will be shutdown. While upgrading of conventional technology to oxy-biodegradable plastics technology has been suggested, this will require a lot of investment by industry and by legislation to make it competitive. Pakistan needs to explore recycling options in the meantime to achieve a circular plastic economy. At the same time, it is also important to note that alternative materials like banana leaves, and plastics-replacing services like take-back schemes are also important job-creators. Also, because of their circular nature by reusing washed containers or by biodegradation, they do not require waste collection and recycling.

I. Impact Assessment of Single-use Plastic Ban in Islamabad: Focus on changing stakeholder actions and perceptions

1. Background

The issue of plastic waste management in Pakistan has worsened over the years. With the highest percentage of mismanaged plastic in South Asia, Pakistan wastes approximately 3.3 million tonnes of plastic each year [1]. Landfills and dumping sites are present but they are few in number and highly mismanaged. A lot of the plastic waste enters land and water bodies across the country. The major contributors to marine pollution by plastics are Asian coastal countries, including Pakistan.

In an effort to control the manufacture and use of plastics in Pakistan, the government's Ministry of Climate Change launched a Statutory Regulatory Order (SRO) that banned the manufacture, distribution and use of single-use plastic within the Islamabad Capital Territory (ICT).

The clauses of the SRO state that:

1. All manufacturing, import and wholesale trading of polythene bags shall be banned from the commencement of the regulation on 14th August 2019. The regulation bans any production, import, sale, purchase, use, trade, supply, storage or distribution of polythene bags in the ICT.
2. The federal agency may allow the manufacture, import or use of polythene flat bags for the following purposes:
 - i. Industrial packing
 - ii. Primary industrial packaging
 - iii. Municipal waste
 - iv. Hospital waste
 - v. Hazardous waste

However, terms and conditions apply to the practice of manufacture or use of polythene flat bags under these allowable circumstances.

3. To be eligible to manufacture or import polythene bags, an application along with the fee and a recycling plan must be submitted to the federal agency. The fee is levied on every product produced or packaged by the applicant, and should be deposited in the government's treasury by the applicant.

After almost a year since the implementation of what is called the single-use plastic ban, this report provides an exploratory assessment of the impact of the ban on various stakeholders associated with polythene flat bags. The following objectives have been determined for this assessment:

1. To assess the impact of single-use plastic ban while exploring environmental, social and economic effects through defined indicators
2. To understand the challenges in the implementation and roll-out of the single-use plastic ban, and the lessons learnt
3. To review the regulatory measures to explore the opportunities and disadvantages it has created.

The MoCC was the lead organisation behind the introduction of the Statutory Regulatory Orders. The Environment Protection Agency (EPA) and ICT Administration are responsible for the implementation and enforcement of the ban. They ensure that production and distribution of single-use plastic bags happen only for the allowed purposes.

To make the stakeholders aware of the conditions of the ban, the MoCC held consultations with stakeholders to map out a feasible SRO. The implementation of the SRO was announced via banners displayed at public and commercial places throughout the ICT. The EPA held meetings and arranged awareness campaigns for information dissemination and continued to stay in touch with the manufacturers even after the ban was imposed. Queries and concerns of the manufacturers and distributors were communicated to and addressed by the EPA. Around 50 awareness campaigns were held by the EPA along with other relevant departments, such as media houses, public and private institutes, and educational institutions. The MoCC continued conducting awareness campaigns after the SRO came into force. Alternatives to single-use plastic bags were distributed through these campaigns to encourage a shift to other alternatives.

2. Approach and methodology for data collection

For the purpose of assessment, primary data was collected by interviewing the targeted stakeholders that include manufacturers, retailers, consumers, recyclers, and the responsible government institutes. Other stakeholders indirectly associated with the plastic ban including Waste Management Companies (WMCs), Water and Sanitation Service Companies (WSSCs), packaging companies and Fast-Moving Consumer Goods (FMCG) companies were also interviewed. Responses were collected through survey questionnaires and telephonic interviews as in-person interviews could not be conducted due to COVID-19-related restrictions.

Each stakeholder was asked a set of questions regarding their stance on the SRO, its impact on pollution control, and on the plastics industry. Any further suggestions regarding increasing the efficiency of the ban were also recorded.

1. **Manufacturers and distributors:** Plastic manufacturers and distributors, mainly small and medium enterprises (SMEs) with business setups in ICT, were contacted via telephone. They were asked about when they came to know about the enforcement of the ban and how it had affected their businesses. Responses from those who distributed or supplied single-use plastic bags from manufacturers to retailers, vendors, and other businesses were also recorded. All of them shared their concerns and experiences regarding the difficulties faced since the imposition of the ban.
2. **Consumers:** Citizens of ICT who have been using single-use plastic bags for domestic purposes and at commercial places were asked about the impact of the ban on their plastic usage and shopping behaviours, among other questions.

3. **Retailers:** Retailers included businesses (shops and restaurants) that used single-use plastic bags for commercial purposes. They were asked about the impact of the ban on their daily operations and how they had adapted to the change.
4. **Government:** MoCC and Pak-EPA from ICT and the provinces were questioned about the success of implementation of the ban and the hurdles they had faced. They were also asked about how they communicated with the other stakeholders about the change in regulations that would accompany the ban.
5. **Non-governmental Organisations (NGOs):** Various NGOs were contacted to discuss the impact that the ban had on pollution control in ICT. They were asked how the terms of the ban could have been better communicated with the other stakeholders, and how the implementation of the SRO could be improved.
6. **Waste Management Companies:** Several WMCs from different cities in Pakistan were interviewed regarding the SRO. They were asked about the difference the ban had on plastic waste reduction in ICT as well as the core problems hindering the effectiveness of the ban. The positive effects that the ban could have on their daily operations were explained by them. The participating companies gave suggestions for enhancing the impact and enforcement of the SRO, as well as for its successful extension to other cities of Pakistan.
7. **Waste and Sanitation Services Companies:** The WSSCs from different cities of Pakistan were contacted. They were asked whether or not they saw a difference in plastic waste reduction in ICT as an outcome of the SRO. Suggestions for better management of the SRO and plastic waste throughout the country were sought.
8. **Fast-Moving Consumer Goods companies:** FMCG companies were asked about their stance on inclusion of plastic waste streams other than single-use plastics in the ban. Suggestions for enhancing the effectiveness of the ban were also gathered.
9. **Packing companies:** Similar questions were asked from packing companies operating in Pakistan. Their response regarding inclusion of waste streams like Styrofoam, which is heavily used for packaging, was recorded. The packing companies also gave suggestions on how to improve the implementation of the ban.
10. **Recyclers:** Recyclers explained how the pollution of inorganic plastic limits the use of organic components in the waste. They were asked if they experienced any difference in plastic waste generated within ICT in response to the ban. Suggestions for plastic waste management were also gathered.

3. Findings and outcomes

3.1. Effectiveness of awareness campaigns

Government institutions (MoCC and PaK-EPA)

Pak-EPA, in collaboration with other relevant government departments, led the awareness campaigns. The departments deployed plenty of human and logistical resources to conduct these campaigns. Between 30 and 50 campaign sessions were held in public and private organisations, such as hospitals, offices and businesses, as well as in educational institutions soon after the ban was in place. Media houses were engaged to help spread the message to the public. The campaigns not only provided information but also distributed free reusable bags to encourage the public to make an attitude shift away from single-use plastic.

After the ban, EPA alone inspected 1500+ businesses for single-use plastic, and found that a vast majority was complying with the ban. Only around 200 of the total businesses inspected were found to be violating the ban and were punished accordingly. Mass compliance with the ban was in part the result of vigorous awareness campaigns that educated the public and encouraged them to avoid single-use plastic bags and move towards the use of reusable bags.

For plastic bag manufacturers, the ban meant a great deal of business remodelling. In this regard as well, the EPA was found to have provided the manufacturers with complete information about the circumstances that allow the manufacture of single-use plastic. When called upon to do so, EPA explained to many manufacturers and distributors that authorisation for manufacturing and distributing plastic bags for hospital garbage and waste management practices was available upon registration of their businesses.

The attempt to engage the masses via awareness campaigns was praised by many NGOs and other public and private sector entities. Despite the lack of any monetary gains through these campaigns, the government prioritised awareness raising in order to influence behaviour and inculcate a realisation among the general public and the provincial governments regarding the harm caused by plastic bags, and the importance of the ban.

Shortly after the implementation of the SRO, awareness activities had halted and inspection weakened due to the COVID-19 pandemic. However, the State Minister of Climate Change, Zartaj Gul, announced the resumption of awareness activities as well as strict enforcement effective March 2021. Enforcement teams comprising senior officials from MoCC and Pak-EPA were regrouped and activated to survey various areas, and to impose fines on the violators of the SRO. Following her orders, various visits were made to commercial areas of ICT to ensure an all-out compliance to the SRO. Violators were charged heavy fines, and the enforcement teams confiscated plastic bags from their shops.

MoCC's initiative Clean Green Pakistan Index (CGPI) is another effort to improve municipal services in selected cities where one of the components is waste management. CGPI is backed by awareness campaigns through the Clean Green Champions initiative and capacity building workshops for the local government. The initiative is identified by MoCC as a proposed expansion point for the SRO where the CGPI cities can adopt the indicators for plastic management, and get help in designing their future course of action.

In the renewed awareness drives on the ban against plastic bags in March 2021, Pak-EPA officials targeted commercial areas of F-7 in ICT, including the Safa Gold Mall. The retailers, wholesalers and consumers in these areas were made aware of the importance of the ban on plastic bags in countering pollution. Announcement of the renewal of implementation of the SRO was made as well. Banners were placed that clearly mentioned the penalties for the violators of the ban, and provided easy access to relevant information. Official accounts of Pak-EPA, CGPI and ICT Administration tweeted about the inspection visits made to different areas in ICT. An awareness campaign via print, digital and electronic media had also been in effect since February 2021 [2].



Image 1 Confiscation of single-use plastic bags from the offending retailers of the SRO in ICT



Image 2 Inspection visitation and enforcement drive by a joint team of the ICT administration, Pak-EPA and MoCC officials in commercial areas of F7, G8 and G9 in ICT

CENTRAL

(Treasury Rule 29)

Cholan No.
Treasurer, Sub-Treasurer,
National Bank of Pakistan,
State Bank of Pakistan

Challan of cash paid in to the _____

To be filled in by the remitter			To be filled in by the Reputational Officer of the Treasurer		
By whom tendered	Name (or designation) and address of the person on whose behalf money is paid	Full particulars of the remittance and of authority (if any)	Amount	Head of account	Order to the Bank
			Rs.	Paise	
<p>میرزا محمد 16201-5126628-9 میرزا محمد 16201-5126628-9</p>	<p>میرزا محمد 16201-5126628-9 میرزا محمد 16201-5126628-9</p> <p>The Director General, Pakistan Environmental Protection Agency, Plot No. 42, Street No. 06, H-82, Islamabad.</p>	<p>Ministerial Head of Federal Government For open violation of Plastic Regulations, 2011.</p>	10,000		<p>10,000/-</p> <p>10,000/-</p>
Signature			<p>10,000/-</p> <p>10,000/-</p>		
<p>(In words) Rupees Ten thousand only</p>			<p>To be used only in the case of remittance to the Bank through Departmental Officer of the Treasurer.</p>		
Received Payment (in words) Rupees			Treasury Officer Agent		
Treasurer	Accountant	Date			

Image 3 Enforcement agencies imposed fines on violators of the ban



Image 4 Inspection visits to commercial areas by enforcement agencies of the SRO banning single-use plastic in ICT

3.2. Stakeholders' response to the SRO

Multiple stakeholders are associated with the ban on single-use plastic. While government institutions and NGOs were involved in awareness-raising and implementation of the ban, other stakeholders such as manufacturers, distributors and consumers were at the receiving end of the resultant impact.

3.2.1. Consumers

More than 200 people from different parts of the twin cities, Rawalpindi and ICT, participated in an online survey designed to assess their reaction and willingness to accept the plastic ban. Irrespective of their income class and background, a majority (94%) of the participants supported the single-use plastic bag ban. The rest were either unsure or disagreed with this idea. A majority, that is 95%, also thought that plastic is harmful to the environment, and 93% agreed that avoiding single-use plastic is important. However, most were unaware of the particularities of the harmful impacts that the single-use plastic bags posed to the environment. Only 40% of the respondents were aware of the fact that plastic does not decompose in landfills, whereas 60% thought that it does.

Awareness campaigns organised by EPA prior to the implementation of the ban, along with strict enforcement especially in the ICT, increased the knowledge of the residents of Rawalpindi and ICT regarding plastic pollution. Eighty per cent of the participants said that they were more aware of plastic pollution now than they were a year ago before the implementation of the ban (Figure 1). In order to influence the thinking of the remaining 20% regarding the harmful effects of plastic bags, further need of awareness campaigns was recognised.

Consumers' Responses Regarding Increase in Their Knowledge About Plastic Pollution (over the year due to the ban)

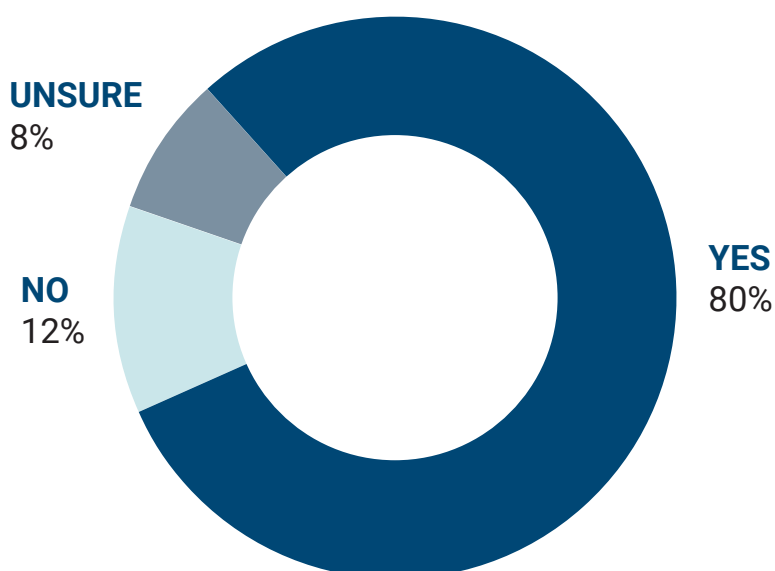


Figure 1 Vast majority of the people who took part in the survey reported an increase in their knowledge regarding plastic pollution, its causes, and harmful impacts.

The habit of refusing to use plastic bags even if provided at shopping centres has not yet caught on. Only 10% of the participants claimed that they always refused to accept plastic bags provided by the retailers when they went shopping, whereas 14% said they never refused plastic bags provided by the retailers. The high percentage of respondents agreeing to use plastic bags, if available, indicates

that further efforts are needed to bring about enough awareness among the public to create voluntary and intentional avoidance of plastic bags.

Survey results show that public attitude towards the use of reusable bags and avoidance of plastic bags varies greatly. The trend shows that the percentage of people who always carry reusable bags (16%) is equal to the percentage of those who never carry them. Also, fewer people refuse to use a plastic bag if provided by the retailer than those who do not.

The practice of taking their own reusable bags is not much prevalent among consumers. Only 35% of the respondents said that they carry reusable bags sometimes, and another 35% said that they sometimes use a combination of plastic bags and reusable bags. These trends show that the practice of using reusable bags is still not very common among consumers, and that they are in the transition phase of switching from plastic bags to safer alternatives.

People shared personal uses of plastic bags other than for shopping. These include disposal of garbage, refuse, and used hygiene products (e.g., sanitary pads). Other popular uses include using plastic bags to carry fruits, vegetables, dairy products and meat.

When asked about the impact of the ban on pollution, more than half the participants reported that they have seen a visible reduction in plastic litter since the ban was imposed in ICT. The survey shows that only 5% more consumers report having observed a reduction in plastic waste than those who report seeing no difference.

Major hinderances cited by consumers to the adoption of reusable alternatives are summarised as follows:

- Lack of availability of alternatives makes it difficult to switch to environmentally friendly options. While single-use plastic bags are still available at some retail shops, alternatives are not.
- The size and strength of the alternative options introduced is another problem. Large-sized, woven plastic or paper bags are not widely available. Those available are too thin and break or tear easily if used to carry heavy objects. Consumers say that plastic bags are stronger, more spacious, and allow easy carrying of a variety of products (grocery, daily use items, items in bulk) compared to the alternatives.
- Whereas plastic bags are available free, the higher cost of cloth and woven bags reduces the willingness of people to opt for them. Even though 65% of the respondents said that they were willing to pay extra for reusable bags, regardless of their income level, most people are not willing to spend much on alternatives. This establishes the need to explore cheaper alternatives like baskets made of mulberry twigs, date and banana leaves (see 3.4.6. Non-plastic alternatives). Refraining from single-use plastic bags and switching to reusable alternatives is still a relatively new practice for people of the twin cities. For years, people have shopped with plastic bags that were provided by the retailers, and so there was no need to carry reusable bags with them everywhere. This habit is seemingly difficult to change. Also, on unplanned shopping trips, one might not be carrying reusable bags. Under such circumstances, survey respondents much rather prefer to use single-use plastic bags, if available, than spending money on reusable bags that are not really needed.
- The alternatives are not leakproof, therefore they cannot be used to carry liquids or meat, necessitating the use of single-use plastic bags. Dairy products like unboxed milk and yogurt, especially, are sold in plastic bags. Meat is also commonly sold in single-use plastic bags; often two bags are used to pack one meat purchase order.

Participating consumers also shared practices that helped or motivated them to adopt reusable bags in place of plastic bags. Many find it helpful to keep some reusable bags in their cars or carry them in their handbags and purses. Hanging them near the door, putting up reminders, or keeping the bags in plain view inside their kitchen also helped them remember to take the reusable bags when going out. Some said that they had already been using reusable bags long before the implementation of the SRO, while others found awareness regarding the harmful impacts of plastic bags via seminars and media very motivating. A sense of responsibility towards the environment thus inculcated helped them transition to environmentally friendly options. According to our survey, digital and electronic media have been especially powerful in influencing people to not use plastic bags. Encouragement from family and friends has also played a major role in influencing a change in habits. Observing local communities, neighbours and celebrities switch from plastic bags to reusable bags was another factor that motivated some of the participants to follow suit. In short, awareness through the media and watching people around them turned out to be the most motivating factors that influenced the participants to refrain from using plastic bags.

A vast majority of the participants preferred to receive further information related to plastic bag alternatives via social media, followed by mainstream media, phone calls/Email/SMS, social and religious community, and newspapers, in that order. It is apparent that media has played a role in influencing the change that favours reusable alternatives over plastic bags, and is also the popular choice of information among people. It is, therefore, one of the most effective tools that the government can use to increase the effectiveness of the ban.

Several recommendations were provided by the participants regarding the government's role in encouraging the use of reusable bags.

- Using social media for a mass awareness campaign to direct attention to the seriousness of the matter was a popular suggestion.
- Stricter enforcement against offenders, especially manufacturers and retailers, via hefty fines was considered a necessary measure for better implementation of the ban. In order to enhance enforcement, involvement of local governments and regulatory bodies was also deemed crucial.
- Since the price of alternative bags has been a major obstacle in influencing people to switch to reusable bags, participants suggested that the alternatives be sold at a lower price or even be distributed free. They should be made readily available at all stores and with all vendors.
- Grants could be provided by the government, industry and the corporate sector to academic institutes for exploring alternative solutions that are strong, tear-proof, non-absorbent, and stretchable like plastic bags.

A majority of the participants supported any plan of banning single-use plastic throughout Pakistan. They believed that the many problems caused by single-use plastic, pollution being the greatest of them, necessitate phasing out of single-use plastic in the country. A few said that the practice of using reusable bags and carrying them everywhere, though hard to adopt, is still a good option. While some look forward to such a time when a plastic ban would be imposed countrywide, others believe that it would cause the closure of several small businesses. The transition, therefore, should be slow, with other opportunities opened up for the current manufacturers of single-use plastic bags.

3.2.2. Retailers

Retailers have an important position within the plastics industry. They act as the link between the manufacturers and most of the end users. To assess the impact that the ban on single-use plastic had on their day-to-day operations, several retailers within the ICT were interviewed. These included

those with businesses like vegetable and fruit shops, grocery shops, supermarkets, meat shops, stationery shops, pharmacies and bakeries. Since the ban, the popular alternatives for plastic bags adopted by retail stores are woven bags, paper bags, cloth bags and fishnet bags, in that order. Only a few of these retailers said that they were aware of the ban before its implementation, but the ban had a severe financial impact on most of them. The reason behind the disruption was the cost of the alternatives. Retailers conveyed that paper bags can be provided to the customers for free but they are not durable enough to carry heavy items or items in bulk. Woven bags made with a mixture of cotton and polythene, although a sturdy alternative, are costly. Retailers have to charge the customers between PKR 10 and 30 per bag depending upon its size, which the customers are unwilling to pay. This causes a dent in the profit margin of their businesses. Some retailers do provide woven bags for free but most of them have well-established businesses. We observed that bakeries and cloth merchants were mostly the ones providing free alternative bags to their customers. On the other hand, most grocers were charging the customers for the alternative woven bags but not for the paper bags or fishnets.

The ICT administration has been making visits to check compliance with the ban but the frequency of their visits varies from place to place. All the interviewed retailers claimed to have switched to alternatives in strict compliance with the ban. A huge amount of plastic-bag waste was thus prevented. Some sectors reported monthly inspection visits to commercial areas while others reported that only a few visits were made right after the ban was introduced but these became infrequent over time. This reduced frequency, according to EPA and MoCC, was due to the pandemic situation.

Regardless of whether or not the retailers were providing alternative bags free of cost, all of them experienced a steady drop in the demand for carry-bags from the customers. Significantly, fewer alternative bags were provided to the customers during the past year compared to the number of plastic bags provided before the SRO. The main reasons for this trend could be that either the customers had started carrying their own reusable bags, or because they were not willing to pay extra for the alternative bags.

While a concern regarding loss of income was shared by a few retailers, most were supportive of the government's efforts to ban single-use plastic bags. They were aware that plastic has a negative environmental impact, which gives enough reason to ban their manufacture, supply and sale. A staggering majority, comprising 91% of the respondents, believed that it is important to ban single-use plastic bags throughout Pakistan because they are non-recyclable and cause pollution. However, they believed that the extension of the ban to other cities should be accompanied by strict implementation, otherwise over time the problem of plastic bag littering would re-emerge, as it had in ICT.

Retailers suggested that the government should encourage people to bring their own reusable bags for shopping so that they would not have to pay extra for the bags. They also strongly recommended that the government reduce the price of alternatives to plastic bags as the current prices are not affordable for many retailers as well as customers.

3.2.3. Manufacturers and distributors

The plastic industry, including manufacturers and distributors of single-use plastic in ICT, complained that they were neither consulted nor alerted before the implementation of the ban. The sudden enforcement affected their businesses and contract investments such as down payments. Many went out of business and struggled to fulfil the outstanding orders to be able to receive their due payments. Pakistan Plastic Manufacturers Association (PPMA) voiced its reservations saying that the association did not support the plastic ban that has led to loss of employment for many related to the plastics manufacturing sector.

The woven bags introduced in place of the single-use plastic bags require a different production technology. Manufacturers said that they lack the financial resources to shift to the production technology for the recommended woven bags. They also said that plastic bags were in demand because of their lower price whereas the woven bags cost much more. Therefore, the demand for woven bags hasn't seen a steady rise despite the ban. The manufacturers and distributors cannot sustain their businesses and pay their employees, leaving them no choice but to close down their businesses. PPMA contended that the government needs to devise a plan to sustain plastic use in the economy. Plastic pollution should be targeted by influencing consumer behaviour rather than by banning plastic. As far as production for hospital, garbage and waste management is concerned, manufacturers and distributors argue that these consumers are unlikely to shift from their current vendors, making it hard for those who went out of business to find new orders.

All the NGOs interviewed were pro-ban yet stated that a slower transition to the plastic ban and prior notice to the plastic industry could have helped the industry adapt better to the SRO. Similar opinions were shared by a majority of the other stakeholders interviewed.

3.2.4. Provincial waste management, and water and sanitation service companies

While the WMCs within ICT reported a decrease in plastic bag littering since the imposition of the ban, the WMCs in other cities are eagerly waiting for the ban to be extended to their areas as well. WMCs from different cities of Punjab, Sindh and Khyber Pakhtunkhwa (KPK) were interviewed to find out their stance on the plastic ban. Some of them became aware of the ban before it was implemented through channels other than the official notice by the government. No consultations took place between the government and the WMCs regarding the design or enforcement of the ban. All the WMCs were in favour of the ban.

The major function of the interviewed WMCs is the collection of waste from private housing societies, cantonment areas, roadside dumpsters, and containers. Some of them also offer door-to-door collection services in residential areas.

After collection, the practice of recycling the collected waste by the WMCs is rare. Plastic waste, along with other waste, is usually dumped or buried in landfills or dumpsites. Those that do recycle the waste usually make compost from the organic material or carry out in-house recycling of cardboard, paper, bottles, etc. Plastic bags are generally dumped, and rarely sold to recyclers for further treatment.

Management officers at the WMCs said that the plastic ban could solve a lot of waste and sanitation-related issues, improving the day-to-day operations of their companies. They were of the opinion that the ban should be extended throughout Pakistan at the same time, or to at least one more province simultaneously, to increase its effectiveness. Several concerns regarding plastic bag waste that were raised could be solved if the ban on single-use plastic bags took place nationwide. Clogging and blockage of the sewerage lines, for example, is a common issue that the WMCs throughout Pakistan have to deal with. Plastic bags are light in weight and easily disperse to treetops, power lines and sewerage streams. WMCs complained that the collection of these bags is not easy because often they are found at unreachable places such as at the top of electricity poles or on power lines. A major problem faced by WMCs is that after waste removal and clean-up from roadsides, parks, commercial areas and empty plots, the colourful appearance of the leftover plastic bags makes them visible, and however small in number, they give the cleaned areas a littered appearance.

The WMCs agreed that the plastic industry would show resistance to the ban as it would lead to the closure of many businesses. Not only do the alternatives require new production technology, their much higher production cost and thus price makes them more expensive compared to the readily available plastic bags, making affordability a problem for a large number of consumers. However, keeping in view the environmental degradation and waste-related problems caused by plastic bags, WMCs believe that the government should continue with the decision. At this point, the government should focus on protecting the environment and solving waste management issues rather than catering to the plastic industry. Resistance would accompany any steps that the government introduces against plastic use but the government's outlook should consider the long-term benefits of such measures. They also believed that once the ban is in place, the industry would be motivated to find alternatives and eventually adapt to the change. To facilitate adaptation, the government needs to provide sustainable solutions and aid the plastic industry with technology development for a smooth transition. The slack in implementation and enforcement has hindered the yield of significant results that were expected of the ban. Therefore, like several other stakeholders, the WMCs proposed awareness-raising campaigns and a strict model of implementation in place before the ban is extended to other cities.

According to the WMCs, people in their respective cities would welcome the ban if it is preceded by proper awareness campaigns and followed by readily available reusable alternatives. Extension of the ban to other cities with a proper enforcement plan would ensure efficient management of waste.

- The restriction on the use of plastic bags would ultimately lead to a drop in the concentration of plastic bags within the waste. This would reduce littering, in turn leading to a drastic reduction in the visibility of waste.
- Clogged sewerage lines are another problem associated with plastic bag waste. The reduction in plastic bags would translate into a decrease in incidences of sewerage blockage.
- Once plastic bags are mixed with the waste, they are hard to segregate. The presence of inorganic plastic pollutes the organic content of the waste, thus limiting the utility of waste. The reduction in the concentration of plastic bags would improve the quality of the waste. This waste could then be used for making compost or for utilisation in waste-to-energy generation projects.
- As plastic bags are not recyclable, their dumping into landfills puts a pressure on the landfills that cannot be alleviated. With an increase in population, the rate of plastic waste generation would also increase, causing the landfills to fill even faster. In Lahore, the Mahmood Booti landfill site has already been closed after reaching its full capacity. Another sanitary landfill site equipped with modern solid waste management technology was established at Lakhudair, and became operational in 2016. This landfill site is nearing its full capacity even though it was meant to serve the city's needs till 2026 [3]. Banning the use and manufacture of plastic bags would ultimately lessen the burden on the landfills, slowing down their filling rate.

The WMCs supported the inclusion of other waste streams such as Styrofoam in the ban. Some said that all hazardous plastic streams should be banned while others proposed a restricted use policy where plastic material such as bags, disposable cutlery and Styrofoam packaging are charged for to discourage their use.

WMCs from various cities see the plastic ban as the right decision to counter the plethora of problems associated with plastic waste. With proper enforcement, the ban should be implemented on a larger scale covering provinces or the whole country simultaneously. Officials of WMCs suggested that if their respective companies are given the power to impose fines for violation of the ban, the enforcement could be made more efficient. They also proposed involving the local government bodies to check for violations in their areas and impose penalties on offenders. Limiting the power of imposing fines

only to the EPA weakens enforcement and puts unmanageable responsibility on the Agency. Young talent should be recruited under a separate programme to oversee the implementation of the ban. Corruption among waste management authorities also needs to be dealt with.

All the WMCs were willing to take the responsibility of distribution of waste collection bags to residential areas when the ban is extended to their cities. As allowed for specified purposes under the SRO, single-use plastic bags could also be used for residential waste collection. Some of the WMCs already provide bags for waste disposal during Eid ul Azha. Connecting to the vendors would not pose a problem, but the companies might charge the residents for the service.

Water and Sanitation Service Companies also supported the ban. They were of the opinion that the sources of plastic generation should be eliminated to reduce plastic waste. The restriction of use should be extended to plastic bottles, and especially to plastic packaging materials that are a major cause of sewerage line blockage. However, the implementation of the ban should not be sudden. Plastics industrialists should be taken on board to plan the transition.

Several participating WSSCs voiced the need for an Integrated Resource Recovery Centre. The removal of plastic components from the waste requires proper methods of waste characterisation, segregation, recycling and incineration. Proper management of waste based on labelling, segregation and characterisation opens the door for other useful opportunities. Refuse-derived fuel (RDF) was one such proposed opportunity that could effectively utilise waste if the plastic concentration in it could be reduced. This would help reduce the burden on landfills as well as generate energy. Other than RDF, organic waste could be converted to compost that could be utilised by the horticulture departments of the government.

3.2.5. Fast-moving consumer goods companies

Although not directly affected by the single-use plastic ban, Fast-Moving Consumer Goods companies are big users of other plastic streams. They were in favour of the single-use plastic ban, and extended support to the idea of banning other harmful plastic waste streams as well. Like most other stakeholders, the FMCGs too were of the opinion that the transition to the ban had been too abrupt for the manufacturers. Therefore, a dialogue should be started with the stakeholders experiencing the negative effects of the ban. New business models need to be provided by the government to the plastics industry that complies with the regulations of the ban. The FMCGs also considered recommendations from the public and close follow-up to ensure continued and efficient enforcement of the ban to be important in increasing the effectiveness of the ban as well as for managing plastic pollution.

3.2.6. Recyclers

Recyclers of plastic were aware that single-use plastic ban was being planned. They favoured the ban for several reasons. Plastic bags are a big problem for the recyclers because they are difficult to collect and segregate. Organic waste gets contaminated due to the presence of plastic bags, and as a result is deemed suitable only for dumping or burning. Recycling businesses are looking forward to the reduction in plastic pollution so that the utility of waste could be increased. They recommended that polythene must be completely banned because it is extremely difficult to deal with, but the ban should also include other difficult-to-collect waste streams such as small wrappers and sachets, and single-use cutlery. A major issue with waste management is the collection of waste, which is often not considered an important factor of waste management. For significant reduction in plastic waste, countering the plastic waste streams that are difficult to collect because of their large volume, small size, or easy littering is important. Recyclers deal with several materials other than single-use plastic,

therefore banning non-recyclable plastic would not yield a significant reduction in their incomes generated through waste recycling.

3.2.7. Packaging companies

Packaging companies use a large amount of plastic to pack various products. Plastic is used as the primary packaging material especially for medicines and food items. It is also widely used for tertiary or transit packaging where a bulk of material, typically boxes, need to be grouped and packed together.

Plastic is versatile in size, shape and flexibility. Along with being lightweight, it is one of the strongest and most durable packaging materials. Therefore, it is used for packing numerous products and is hard to replace. Packaging companies were not in favour of the ban as it would have a negative effect on the plastics industry. They also criticised the choice of non-woven bags in place of single-use plastic bags, saying that if getting rid of plastic pollution is the main target then replacing one type of plastic bag with another was not a solution. Instead, they recommended increasing the thickness of the plastic to make the plastic bags more durable and reusable. A micron is the unit used to measure the thickness of plastic bags. Increasing the micron count would increase the quality and strength of the bags. This was proposed to the Sindh government as a possible solution to plastic pollution. PPMA proposed that the size of the bags be standardised and their thickness increased to 60 microns to make them reusable and recyclable multiple times. As the thicker bags would be more expensive, consumers would use them more often. Similar measures were also proposed by EPA.

3.3. Environmental benefits of SRO

It is too soon to provide a quantitative analysis on how the ban benefited the environment. However, some environmental benefits of the SRO pointed out by the respondents are as follows:

- NGOs appreciated the ban as a step in the right direction, and reported observing a visible reduction in pollution in some places, such as in Margallah Hills National Park. This Park is a benchmark achievement as it is the first park ever to become plastic free in Pakistan.
- A majority (53%) of the consumers from the twin cities of Rawalpindi and ICT who participated in the survey, reported a visible reduction in plastic pollution and littering in ICT since the implementation of the ban. Plastic-bag waste had decreased significantly on land as well as in water bodies such as Rawal Lake.
- To avoid hefty fines and the confiscation of already bought plastic bags, all the retailers we interviewed in ICT had shifted to using alternative bags. Since the ban, they had stopped using plastic bags, which prevented several thousand kilograms of non-decomposable plastic bags from ending up in the environment and polluting land, air and water bodies.

3.4. Identification of gaps, challenges and solutions

Stakeholders who participated in the interviews and surveys pointed out numerous issues related with the single-use plastic ban. Most of them said that the ban was a much-needed step to control plastic pollution. However, some of them were not fully satisfied with the implementation of the ban. The MoCC as well as NGOs and local governments from across Pakistan opined that a major issue hindering the progress expected of the ban was its weak enforcement, because of which the littering situation in ICT had not changed significantly. According to WWF the enforcement had become less transparent. Although penalties are defined, they were often manipulated, which weakened implementation. UN-

Habitat recalled the successful implementation of the ban on black plastic bags, and proposed that similar strategies be used for the implementation of the single-use plastic bags ban.

Some other problems pointed out included lack of prior warning or facilitation for the plastic industry, non-availability of alternatives, and costly alternatives.

The stakeholders suggested several measures that the government could undertake. It could collaborate with the private sector, wherever possible, to increase the effectiveness of the ban and of plastic waste management in general. The problems conveyed and the solutions proposed are discussed below:

3.4.1. Capacity building of enforcement agencies

The most common shortcoming highlighted by the stakeholders, which hindered the effectiveness of the ban, was the laxity in enforcement and imposition of fines as dictated by the SRO. Although they commended the efforts of the EPA and MoCC in inspection and enforcement, which started with much vigour, the strictness in the implementation of the ban eased as the days passed. The first month following the ban witnessed a massive behavioural shift among manufacturers and consumers due to awareness campaigns and strict implementation of penalties. With the passage of time, the strictness eased and enforcement became less transparent, lowering the effectiveness of the SRO. Some retailers reported that inspection visits to their shops were made only during the early days following the ban, thereafter plastic bags soon returned to the market.

It was generally understood that implementation will take time, however NGOs, consumers, WMCs, and local governments especially, stressed the need for strengthening implementation. Proposed steps included a better monitoring system, imposition of heavy fines on offenders of the SRO, and decentralisation of power to impose penalties on violators. WWF pointed out that although the ongoing pandemic had shifted the government's priorities, the efforts made and the momentum gained to fight plastic pollution should be continued by MoCC.

EPA revealed that capacity building both in terms of logistics and human resources is required for proper implementation. At present the department lacks sufficient resources and often the police cover required during inspection. Only three officers currently carry out inspection whereas the estimated requirement is of at least 20 more inspectors. A shortage of a suitable fleet of vehicles also hampers sustained enforcement efforts across all sectors and rural/urban areas of ICT. Insufficient resources are affecting the implementation even though the EPA inspects around 10,000 shops, retailers and vendors in ICT on a regular basis.

3.4.2. Further need of awareness campaigns

Consumer behaviour is deeply rooted in plastic use, and any significant change would require mass education. Although the EPA had conducted numerous campaigns and awareness sessions, all the stakeholders felt the need for more such activities. All participants including WMCs, local government bodies, and NGOs emphasised the need for campaigns in schools, colleges, universities, public places and via media channels. Awareness about the need to avoid use of single-use plastic should be made a part of formal education in Pakistan. Assessment of consumer responses revealed that the public wants and needs to be educated about the harmful impact of plastics on the environment, and consequently on their own lives. This would encourage them to voluntarily refrain from using plastic bags even if the bags are available. Specific campaign models should be developed to raise awareness among the general public, industry, students at all levels and small businesses. All tools at hand, such as print and electronic media, formal education, billboards and pamphlets should be employed for the purpose.

Awareness regarding the available alternatives should also be imparted to give the public a solution. Incentivising the use of alternatives to plastic bags would encourage them to avoid using single-use plastic bags. Furthermore, the respondents suggested that other plastic streams such as Styrofoam should be brought under the ban only if truly environment friendly alternatives were available, and after carrying out a mass awareness campaign regarding the ban and its implications.

3.4.3. Need to address complications arising from Covid-19

The stakeholders also discussed the complications arising as a result of COVID-19. They argued that the use of recyclable plastic faced a huge setback during the pandemic as reusing plastics from masks, gloves, water bottles, personal protective equipment (PPE), and other plastic-based protective gear and objects aided the spread of the virus. The challenges of the pandemic also shifted the government's priorities to provision of healthcare facilities and sustaining those who had lost their livelihoods as a result of the lockdown, which slowed the implementation of the plastic ban. Current and future regulations need to take into account the pandemic situation and the resultant consequences related to plastic ban and recycling.

3.4.4. Plastic industry hit hard by the ban

An important issue brought to light was the negative impact the sudden implementation of the SRO had on the livelihoods of many connected to the plastic industry. The lack of communication between the implementing agencies and the plastic industry regarding the imposition of the SRO took many manufacturers and distributors by surprise. Stakeholders from the industry and the NGOs were of the opinion that the change was too abrupt for small business owners to adapt to it. As a result, they were left to choose between shifting to the production of new bags, which is an expensive investment, and closing their businesses altogether. Most of the participating manufacturers and distributors had wrapped up their businesses as they could not upgrade to produce the woven plastic bags due to lack of financial resources and the required machinery. The participants predicted that a continuing miscommunication between the plastic industry and the government's regulatory bodies could result in a show of aggression and resistance from the industry.

Throughout Pakistan, the plastic industry employs women for manufacturing plastic bags at the household level. Women from several households on the outskirts of the federal capital and the province of KPK run small machines at home, making plastic bags in order to earn some income [4]. In the wake of the imposition of the SRO, many such women-headed households lost their only source of income. Such small-scale manufacturers are left without the capacity or the training to take up manufacturing of bags from alternative material.

The stakeholders suggested several measures to help the industry transition to this change. These included:

- Collecting baseline and ground data to assess the capabilities of businesses and their ability to shift to new alternatives.
- All stakeholders should be consulted and their concerns addressed before the implementation of the ban.
- Plastic industry, especially the manufacturers, should be instructed before the ban comes into force. Islamabad Chamber of Commerce and Industry expressed willingness to work alongside the enforcement agencies in disseminating information to the manufacturers as well as regulating the ban.
- All stakeholders should be consulted and their concerns addressed before the implementation of the ban.

- Easing the ban and giving the industry some upfront time to plan the shift to new alternatives.
- Providing subsidies, capacity building opportunities and initiatives for manufacturers of single-use plastic to replace their machinery with that required for the production of the woven bags.
- Training small-scale manufacturers, especially women, to make bags from alternative materials such as cloth, jute, etc.

3.4.5. Lack of ethical practices

Manufacturers and distributors expressed some concerns regarding the new policy for woven bags and allowable circumstances for single-use plastic. The EPA had allowed plastic bag production for use in hospitals and for waste management. The businesses have to register themselves to do so after which they are provided contracts for various hospitals and WMMCs. However, according to the industry participants, the allocation of contracts involved bribes and corrupt practices. They suggested that the government should ensure that the contractual agreements are transparent and free of bribe. Moreover, under allowable circumstances the EPA should allow the manufacturers and distributors to work with hospitals or waste management authorities of their own choice; that is, open registration should be allowed.

As the lack of technological abilities hindered many businesses from moving to the production of woven bags, loans were suggested to facilitate the transition. The manufacturer community, however, is reluctant to take interest-based loans. But if the loans complied with religious and ethical norms, they would consider taking them to move to the production of woven bags. Having spent a lifetime in the plastic industry, they would rather continue to obtain their livelihood from it rather than face the challenges of moving to other businesses.

The sudden imposition of the ban, which led to a decline in their businesses, has made manufacturers reluctant to shift to the production of yet another type of plastic bags that might also face a ban in the future. Hence, to guard against financial loss, they demand that the EPA issue them written permits ensuring that the production of the new alternatives would not be stopped in the future.. The EPA reported that three manufacturers and seven importers had applied for registration for authorisation of production and distribution of flat polythene bags.

3.4.6. Non-plastic alternatives

Woven bags provided as an alternative for plastic bags are also made of plastic, namely, polypropylene. This has raised several concerns among environmental conservation organisations and among the industry. Both are concerned that switching from one plastic to another is not the solution. Environmentalists believe that oxy-biodegradable plastic alternatives are unsuitable as they will fragment to microplastics. Microplastics have the potential to enter food chains and ecosystems making it even harder to deal with the plastic pollution. Manufacturers believe that their businesses will remain in danger even if they shift from one plastic to another because in the future the government might decide to ban the production of woven bags as well. Moreover, the woven bags can cause more severe blockages in the pipelines and water bodies, providing no solution to the problem.

It was suggested that recycling of plastic be considered as an option, and non-plastic alternatives should be introduced in the market. Officials of the MoCC argued that the compliance strategy for the SRO lacked the provision for planning to enable businesses that are capable of producing non-plastic alternatives. SMEs had come forth with proposals for sustainable alternatives such as water dissolvable bags made from starch, but the lack of planning in this regard hindered any progress.

In southern Punjab numerous artisans, many of them women, weave baskets with mulberry twigs and palm or banana leaves. This raw material is a readily available, sustainable option that needs to be explored. There are abundant craftspeople who can be mobilised to increase the production of baskets as an alternative to plastic bags. However, the rights of the labour and artisans to fair wages must be respected, and minimum wages defined in order to systematise and promote the practice of basketry. Furthermore, access to the market, efficient business models, and training could be utilised to help small businesses in increasing production. A recent trend of online sales of products made by local artisans via NGOs, social projects and enterprises has not only provided easy access to the customers for local handicrafts including baskets, but has also helped artisans earn a rightful price for their hard work. Internet access has acted as a bridge between the producer and the consumer to the benefit of both, and needs to be further promoted [5].

For sustainability in the practice of basketry, the forest department also needs to play an important role. Once the regular permit to cut branches and leaves is issued after public auction, the trees cut down must be replaced with new plantation. In Chichawatni, a shortage followed by a price spike of mulberry sticks was observed recently. The main reasons behind the unavailability of twigs for basketry and other handicrafts were the illegal practices of the timber mafia involved in mulberry tree theft and the negligence of the forest department staff in replanting trees to alleviate shortage [6].

According to the 2018-19 Pakistan Customs Tariff Report, the customs duty on plastic used for packaging and conveyance is 20% [7]. MoCC officials believe that this duty needs to be increased to reduce demand for consumption. Higher prices would motivate manufacturers to look for alternative materials.

Alternatives for other polluting plastic waste streams such as Styrofoam containers for takeout food and plastic cutlery also need to be promoted. Using reusable aluminium containers as part of a take-back system or biodegradable containers could help reduce Styrofoam waste. Similarly, incentives such as discounts to customers who bring their own containers and cutlery (reusable cups, spoons/ forks and straws) could also prove effective in changing user behaviour and reducing plastic waste generation.

3.4.7. Plastic pollution from other waste streams

Plastic pollution is on the rise. More plastic is being brought into the economy than is being recycled. Thin plastic bags litter easily, are hard to collect, and pollute land as well as water bodies. In addition to the SRO, recycling the current plastic waste is needed to effectively tackle the problem.

It was suggested that the federal government should go soft on the plastic manufacturing industry if they move their production so that it is based on circular models that involve recycling. Smaller sizes and thinner bags can be replaced by thicker bags that can be recycled multiple times. If a standard size and thickness is mandated, manufacturers and brands could be made to print their name clearly on the bag to help regulate any deviance.

Moreover, PPMA's discussions with the recycling associations revealed that the sector needs help only with plastic collection. Upon efficient collection, the plastic could be recycled into durable products like benches. The government could mobilise the private sector in plastic collection as it has the capacity to greatly aid the process. As is the custom in many countries, waste collection and management could be outsourced to private companies. This activity is currently disorganised as it is handled by the informal sector. Under an organised and streamlined collection system that recovers all the plastic, standardised bags from the waste could be efficiently recycled. Such an environment also holds the potential to encourage entrepreneurs to innovate and invest in recycling models. In this way, plastic could continue to be a major contributor to Pakistan's national exchequer.

At the same time, even if recycled and turned into more durable products, a continued growth in plastics is leading to environmental problems. By “upcycling”, the amount of plastics entering the environment is not solved but merely hidden or stored away for some time. Only if there is a fully circular system in place, with a limit to virgin plastics being produced, and economic incentives to fully recycle existing plastics, would the plastics growth trajectory be curbed and the environmental problem it poses be solved in the long-term.

It is important to note that at the household level, nearly all plastics products are expendable: there was a time before plastics. There are locally-sourced, cheap, eco-based alternatives available, such as mulberry twigs, banana and date leaves, and paper-based and take-back system alternatives. This also creates employment at the local level.

3.4.8. Exposure of child labour to hazardous environments

Approximately 12 million children in Pakistan are involved in intensive child labour [8]. Household work, the brick kiln industry, waste scavenging and automobile workshops are some areas densely saturated with child labour [9]. These small income-generation streams often put children in harm’s way. The informal sector of waste collection hires children to collect waste from households and roadside dumpsters. Skimming through garbage without any protective gear exposes young children to hazardous and dangerous conditions including toxic waste and infectious diseases. Plastic bag collection is a major part of their scavenging jobs. It was suggested that policies be developed to formalise the waste sector through proper regulations and prevent such practices.

3.4.9. Approaches other than imposing a ban

Policy measures other than imposing a ban should be explored. The EPA suggested taxing polythene plastic bags to discourage their use by consumers. Manufacturers could be taxed at the time of establishment of their businesses under the Extended Producer Responsibility to responsibly dispose of the plastic waste generated by the use of plastic bags, making them less profitable and leading to a shift of business models away from plastics altogether. If the ban is extended to other cities, it should be backed by thorough market surveys and feasibility studies to not only enhance its efficiency and effectiveness, but to also reduce its negative effect on people’s livelihoods.

Another approach would be to restrict the use of plastic rather than banning it. Pricing plastic streams like Styrofoam, disposable utensils, straws, packaging material, etc. would discourage their use among the general public. Similarly, innovative solutions to encourage the public to recycle plastics could also greatly help with managing the generated waste. An example from western countries quoted in this regard was that customers, upon returning plastic bottles to a store, get some money back. This, however, requires functioning collection and recycling systems, and economic incentives aligned with recycling. Customised solutions that cater to the need of the public should also be explored. For example, instead of banning Styrofoam containers and plastic cutlery, they could be redesigned to make them reusable.

3.5. Success stories

It is not easy to bring a sharp shift in the prevalent use of plastic bags and switch to eco-friendly alternatives all of a sudden. The ban has been difficult for the plastic industry as well as the consumers to follow. However, the past year (2021) yielded several initiatives and stories of success that emerged from a motivation to accelerate the shift towards better alternatives in order to conserve the environment. Initiatives were seen to be taken throughout ICT to encourage people to avoid manufacturing, selling and using plastic bags.

Some of the success stories that emerged recently are:

The Minister of Education in Pakistan, Shafqat Mehmood, ensured support for initiatives that bring sustainable alternatives for single-use plastic. In a tweet, the State Minister of Climate Change, Zartaj Gul, thanked Shafqat Mehmood for his support for these initiatives with the hope of seeing their integration at a commercial level.



Image 5 Tweet by Pakistan's State Minister of Climate Change Zartaj Gul, Pakistan's Minister of State for Climate Change tweeted acknowledging the support of Minister of Education, Shafqat Mehmood, towards initiatives that can provide sustainable alternatives to plastic bags.

Several leading clothing brands have been using paper bags instead of plastic bags for quite some time. However, the SRO further strengthened their efforts to reduce the use of plastic in their packaging. Among these brands, Sapphire has adopted an interesting approach by introducing biodegradable canvas bags (Image 6).



Image 6 Sapphire, a leading clothing brand of Pakistan, has introduced seed-filled tote bags made from cotton waste to reduce the use of plastic in the packaging

These eco-friendly bags are made from cotton waste which gives them their cloth-like appearance. The use of cotton waste makes them stronger than paper bags, allowing multiple uses. Not only that but they introduced another eco-friendly bag that holds plant seeds in the fabric (Image 7). Once the consumers are done using the bag, they can follow the instructions provided on the bag for planting these seeds. The cotton bag is shredded and buried in the soil, from where the seeds find their way into the soil. This innovative idea also sparked an interest among the consumers and was highly praised, serving as a way of awareness raising in itself.



Image 7 Sapphire bag embedded with seeds

Learning more about the harmful immediate and long-term implications of single-use plastic bags motivated some of the consumers to quit using single-use plastic bags and take reusable bags with them when going out of the house. Gathering such knowledge instilled a sense of responsibility among the consumers towards the environment and motivated them to act responsibly.

Food franchises are also stepping in to play their part towards the promotion of single-use plastic ban. Burning Brownie, a food franchise in ICT, has replaced plastic straws with paper straws in an attempt to reduce the use of single-use plastic waste generation (Image 8).



Image 8 A food franchise in ICT, Burning Brownie, has replaced single-use plastic straws with paper straws.

The German Embassy in ICT extended its support to the SRO by distributing colourful reusable cloth tote bags in government schools and in the commercial areas of Aabpara Market and Blue Area. The Embassy acknowledged that awareness must be raised among people regarding plastic reuse to save the environment (Image 9).



Image 9 The German Embassy joins the awareness drive The German Ambassador to Pakistan tweeted about the distribution of cloth bags to students and shoppers to extend support to the SRO against plastic use.

FMCGs are hotspots of plastic utilisation. In an effort to reduce its plastic waste, Unilever started the #FaceThePlastic campaign, which aims to raise awareness among the public about plastic pollution, recycling and reuse. The company used social media and mobilised several celebrities to inspire the general public to avoid using plastic. Unilever has also committed to halve the use of virgin plastic in the packaging of their products. The company has also committed to collect and process more plastic packaging than it sells. Both these targets are set to be achieved by 2025 [11].

3.6. Lessons learned

Single-use plastic ban in Pakistan was a first-time measure taken under the Prime Minister's CGPI. The implementation of the ban and the consequent positive and negative impacts generated several lessons that could help enhance the effectiveness for further plastic waste management efforts.

- Advance notice and proper guidance and facilitation for moving to a new production technology could help businesses to prepare for the shift to newer alternatives, and to overcome the economic hardship caused by the abrupt ban of single-use plastic.
- Alternatives provided for single-use plastic should not be plastic. Woven bags and degradable plastic bags introduced as alternatives can lead to the formation of microplastics, which contaminate the environment at the micro-level. Moreover, to get better support from environmental conservation organisations, non-plastic alternatives must be developed.
- Awareness raising is crucial in bringing about a significant change. Both manufacturer and consumer behaviour need to be addressed via awareness through formal education, media, entertainment industry, etc. It is crucial to impart knowledge regarding the destructive nature of single-use plastic, and also of the alternatives that could be used in its place.
- Consumer awareness regarding plastic waste and its pollution has increased significantly since the ban was imposed. However, consumer behaviour has revealed that people are still willing to use plastic bags, if available. More work therefore needs to be done in this regard to influence a voluntary avoidance of plastic bags.
- Even though consumers from different backgrounds support the ban on single-use plastic, and 66% of our participating consumers showed a willingness to spend on reusable alternatives, there is a persistent need to explore cheaper alternatives. A majority of the participants were willing to spend only up to 2% of their income for reusable alternative bags. Furthermore, the retailers have to spend more on reusable alternatives than on plastic bags and thus are experiencing losses in business, and requested immediate steps for a solution. Therefore, there is a need to explore, research and invest in the production of locally-sourced, cheap alternatives such as baskets made of mulberry twigs, banana and date leaves, and cloth bags made from cotton waste. Such initiatives would not only provide livelihoods to many craftspeople and artisans but would also put plant waste into recycling.
- There was a lack of understanding regarding the harmful effects of plastic on the environment. Awareness regarding these issues needs to be raised on a large scale so that the general population can understand the link between environmental and human health, as well as the threats that plastic pollution poses to both. Among other measures, social media could be effectively utilised to spread awareness among the masses regarding the harmful effects of plastic pollution. Engaging celebrities from various fields could help catch people's attention and encourage them to refrain from using single-use plastic.

3.7. Expected challenges in scaling up SRO implementation

The SRO regarding the ban on single-use plastic requires a massive change in processes, operations and habits. Therefore, as noted above, there have been several challenges in its implementation. However, there is an urgent need for scaling up such steps to control plastic pollution and limit its harmful effects throughout Pakistan. But the scaling up and extension to other cities will present its own set of challenges.

- The major challenge to be expected in scaling up the implementation of the SRO is the loss faced by the plastic industry. Scaling up would require the shutting down of businesses that are extensively involved in plastic manufacture and distribution.
- As most of these businesses lack the resources to move to new technologies needed for the production of woven bags, their incomes will be seriously affected. With few businesses manufacturing alternative bags, the public demand will not be met, which would further raise the cost of the already higher priced woven bags.
- According to the NGOs, the residents of ICT are more environmentally conscious than residents of the rest of the country. This was also borne out by our survey which showed that 94% of the respondents supported the ban, and as a result they showed willingness to cooperate with initiatives like the current SRO that conserve the environment. Arguably, this attitude facilitated the implementation of the SRO in ICT. However, this may not be the case in other cities. The willingness to cooperate with the ban might be low, based on the level of awareness and environmental literacy of the citizens.

4. Recommendations

The SRO is a good step to control plastic waste. However, it is not free from irregularities and has room for improvement. The following recommendations were made to make it more effective.

Strengthening the implementation approach

- Bans should be implemented with a step-wise and phased approach. Before the extension of the ban to other cities, market surveys and baseline studies should be conducted to assess public attitude and behaviour. Prior notice should be given to all stakeholders, including an advance notice to the plastics industry to prepare for the ban.
- A strategic approach to identify hotspots of plastic-bag use should be developed. Alternatives should be made readily available at these hotspots, which should be followed up with frequent visits to monitor compliance.
- Government should introduce soft measures to encourage the industry to take voluntary actions against the generation of plastic waste.
- Strict enforcement should follow the imposition of the ban. Inspection visits should be carried out routinely to check for compliance and to penalise offenders, especially in commercial areas.
- Cheaper alternatives to plastic bags should be researched and introduced, or the price of currently used alternatives like woven bags must be reduced to make them accessible to a larger population. Nonavailability of alternatives like woven bags or cloth bags are hindering consumer

compliance to the ban in some areas of ICT. The alternatives should be made readily available throughout the capital.

Technical, technological and financial support for manufacturers

- Manufacturers of plastic bags should be facilitated with technology support and training in order to help them upgrade their businesses for the production of woven bags and other alternatives. Government should work with corporate and private sectors to provide incentives for shifting towards cleaner production technology.
- Loans for technology upgrade and contracts for manufacture of plastic bags under allowable circumstances should be free of interest and bribes. Unethical and immoral practices that contradict religious norms prevent many manufacturers from taking advantage of such opportunities. Therefore, cultural and religious norms should be considered while designing support mechanism rules, ordinances and laws.
- EPA or a concerned authority can provide permits to the manufacturers willing to upgrade production to woven bags, to ensure security for their businesses. These permits should mention that the manufacturing of woven bags would not fall under a sudden ban like plastic bags. In case in time a ban is also implemented on woven bags as they too are made of plastic, the manufacturers with the permit should be allowed to continue production till they can move to other alternatives.

Strengthening waste recycling models

- Recycling provides a sustainable solution to waste production while still supporting the plastic industry. The government should, therefore, provide a conducive environment for recycling initiatives and entrepreneurial projects. Circular manufacturing models that necessitate recycling of plastic should be made available to the manufacturers.
- Waste streams should be identified on the basis of end use and the plastic's life span to develop circular business models for reuse and recycling. Practices of waste stream quantification should be introduced to identify the plastic streams that cannot be reused, for inclusion in the ban.
- Minimum plastic manufacturing guidelines should be set to make it sustainable for businesses to use discarded plastics rather than virgin material. Legal measures must be in place to ensure recycling of plastics by the manufacturers.

Plastic-bag standardisation

- Thinner plastic bags should be replaced by standardised thicker plastic bags. Increasing the microns of the plastic bags would make them reusable and recyclable.
- Plastic bag manufacturers should be required to print their logos on their plastic bags so that any deviance from the standardised guidelines can be traced back to the manufacturers.

Re-arrangement of enforcement authority

- Decentralise the power to impose fines for violation of the ban, and allow WMCs, local governments and DCs to oversee implementation and impose fines in their area according to the regulations set by the federal government.

Strategising waste management

- Identify the variables that affect the rate of increase of waste rather than focusing on the waste itself. Variables that positively influence the rate of increase of waste should then be dealt with. Similarly, harmful and irresponsible behaviours of plastic littering and pollution generation should be minimised to eventually eliminate plastic pollution.
- At the national level, a proper waste management system should be mapped out through policy development, keeping in view the environmental concerns of waste generation. An Integrated Resource Recovery Centre must be set up based on robust models for waste collection and treatment. The Centre should ensure critical practices of waste labelling, proper segregation (at household and WMC level) and recycling.
- Plastic bags should be banned in other cities to solve waste management problems like littering of bags and clogging of sewerage lines. The CGPI initiative should adopt indicators to help understand the effectiveness of the initiative under the waste management component, and also for better data collection to design future plastic management policies and plans.
- Segregation of inorganic plastic waste from organic waste would improve the quality of both waste streams. This waste could then be utilised for making compost or in waste-to-energy projects.
- Other single-use waste generation streams such as Styrofoam, plastic used in packaging, small plastic sachets and wrappers, disposable plastic cutlery, plates and cups, that is, plastic-based wastes that litter easily and are difficult to collect, should also be banned. Ultimately, all plastic manufacture should be stopped.
- Customised approaches need to be explored and developed for plastic use rather than completely banning it. For example, rather than banning Styrofoam, containers made from it should be redesigned to make them reusable multiple times. Pricing could be a mechanism to discourage excessive use of plastic products, for instance, charging for Styrofoam containers rather than giving them for free to the customers.

Technological upgradation

- Scientifically-engineered landfills capable of waste treatment should be developed. Technology upgradation for the waste management sector, like provision of incinerators, should be prioritised to better tackle the problem of plastic pollution.

Change mobilisation

- Departments and authorities responsible for the implementation of the ban should be the trendsetters of change. Pak-EPA and MoCC should lead by example by making their offices plastic free. Such steps would encourage the public to follow suit.
- Disposable utensils should be replaced by decomposable alternatives like bamboo or banana-leaf plates and cups, and wooden cutlery.

Policy reforms

- Customs duty on imported plastic used for packaging should be increased to discourage its consumption by local manufacturers. Higher customs duties might also act as a motivation for exploring non-plastic alternatives for packaging.

- Manufacturers of plastic bags should be taxed at the time of establishment of their businesses under the Extended Producer Responsibility, holding them accountable to responsibly dispose of plastic waste generated by the use of plastic bags.
- Baseline data collection and research should form the basis of policies and regulations governing plastic use. The process should be free of influence by all other lobbies.

Exploration of alternatives

- Research grants should be provided to academic institutes to explore non-plastic alternatives. Financial support should be offered to SMEs that already have alternative solutions. The SRO should include regulations that provide guidance for supporting such practices.
- Sustainable options like basketry from plant waste, such as mulberry twigs, banana and palm leaves, should be explored. Fair prices for the baskets and fixed wages for the artisans should be set to prevent labour exploitation.
- Substitutes should be explored for plastic cutlery and utensils that are used widely in restaurants. The use of options like aluminium-foil containers, cardboard boxes and wooden utensils should be encouraged.

Waste-sector labour reforms

- Wage rights for the artisans, especially for women, should be ensured. Women involved in the craft of basketry must be given the same level of access to the markets as their male counterparts. It should be ensured that they are not exploited or under-waged due to gender discrimination.
- The informal sector of waste collection that heavily recruits children as scavengers and collectors should be formalised. Child labour in this sector should be discouraged and prevented through proper regulations.

Incentivising change

- Opportunities should be explored to incentivise compliance to the ban through community engagement under CSR activities in order to encourage the general public to avoid using plastic bags.
- Restaurants could provide discounts or other incentives to customers who bring their own containers.

Awareness raising

- Print, electronic and digital media should be employed for massive awareness campaigns. The campaigns should focus on conveying the harmful effects of plastic use on the environment and its inhabitants.
- Information about the negative effects of plastic pollution should be included in academic curriculums to help inculcate an attitude of avoidance of plastic at an early age among children. Governments should collaborate with like-minded public/private organisations, NGOs/CSOs and coastal communities to create awareness on plastic pollution, and design campaigns for youth and children for behaviour modification, for example, by setting up nature clubs in schools.

Addressing emerging challenges

- The complications in plastic waste generation arising due to the COVID-19 pandemic must be addressed. Guidelines for collection and recycling of masks, disposable gloves and PPE should be defined in order to prevent these new plastic waste streams from further exacerbating the problem of plastic pollution and viral contamination.

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Appendix 1: Summary Indicators for the Assessment and Results

Outcome	Category	Indicator	Measurement	Targeted audience	Data collection methods	Results													
Effectivity - shift in norms	Public acceptance and support	Attitude/ Behaviour	% of surveyed population pro-ban	Consumers	Online surveys	94%													
			% of surveyed population taking their own bags/containers for shopping	Consumers	Online surveys	<table border="1"> <tr><td>Always</td><td>16%</td></tr> <tr><td>Never</td><td>16%</td></tr> <tr><td>Often</td><td>23%</td></tr> <tr><td>Rarely</td><td>19%</td></tr> <tr><td>Sometimes</td><td>24%</td></tr> <tr><td>Unsure</td><td>3%</td></tr> </table>	Always	16%	Never	16%	Often	23%	Rarely	19%	Sometimes	24%	Unsure	3%	
		Always	16%																
		Never	16%																
		Often	23%																
	Rarely	19%																	
	Sometimes	24%																	
	Unsure	3%																	
	Knowledge/ Awareness of ban	% of surveyed population having knowledge of importance of ban for environment	Consumers	Online surveys	94% pro-ban 95% know the impacts of plastic on the environment														
	Age-wise data of surveyed population on if Plastic is harmful to the environment	Consumers	Online surveys	<table border="1"> <tr><th>Age</th><th>Agree</th><th>Disagree</th><th>Unsure</th></tr> <tr><td>15-24</td><td>94</td><td>2</td><td>3</td></tr> <tr><td>25-35</td><td>99</td><td>0</td><td>1</td></tr> <tr><td>36 +</td><td>88</td><td>6</td><td>6</td></tr> </table>	Age	Agree	Disagree	Unsure	15-24	94	2	3	25-35	99	0	1	36 +	88	6
Age	Agree	Disagree	Unsure																
15-24	94	2	3																
25-35	99	0	1																
36 +	88	6	6																
Awareness sessions/campaigns conducted by MoCC and effectivity	Consumers	Interviews	30-50 campaign sessions 80% of surveyed population informed increase in knowledge on plastic pollution after the ban 82% encouraged their peers to comply with the ban																
Alternatives distributed for awareness	Consumers	Interviews	Cloth, jute and woven bags																
Impact of penalties	Impact on retailers	Surveyed retailers complying with SRO	Retailers	In person interviews	All of the retailers except for poultry and fresh milk shops were complying														
		Retailers fined during the first year	Retailers	In person interviews	1500+ businesses inspected 200 businesses fined for violations														

Outcome	Category	Indicator	Measurement	Targeted audience	Data collection methods	Results
Environmental impacts	Littering	Visible land litter	Compared to reference year 2019	All stakeholders	Online surveys and interviews	53% consumers reported reduction in litter on land and in water bodies (including Rawal Lake).
		Water bodies litter	Compared to reference year 2019	All stakeholders	Online surveys and interviews	NGOs reported visible reduction in plastic pollution as the Margallah Hills National Park became plastic free.
	Waste prevention	Reduced plastic bag waste generated	Reduction of consumption compared to reference year 2019 Supply to the markets	Retailers and manufacturers	Interviews	Manufacturers reported a fall in demand of plastic bags in the market.
Economic impacts	Internal market and functioning	Reduction in consumer choice	Reduction in number of bags put on the market	Retailers and manufacturers	Interviews	Approximately 29,180 kg/year of plastic bags from surveyed outlets that were previously being provided by the retailers to the consumers were stopped from appearing on the market.
		Choices of alternatives	New alternatives introduced	Consumers, retailers and manufacturers	Online surveys and interviews	Paper bags, woven bags, jute bags and cloth bags
		Cost to consumers for alternatives	Cost to consumers for purchasing reusable bags and bags for other purposes e.g. household rubbish etc.	Retailers and manufacturers	Interviews	10 – 30 Pakistani Rupees
	Trade	Relocation of economic activity	Balance of trade for the plastic industry	Manufacturers	Interviews	Manufacturing completely shut down
	Operation costs/ SMEs	Cost to retailers	Cost impacts on retailers Savings in providing free single-use bags. Costs in providing alternatives Monetary (rupees)	Retailers	In person interviews	Loss in revenue reported. Consumers are usually being charged for the alternative bags to manage the cost borne for procurement of alternative bags by retailers.

Outcome	Category	Indicator	Measurement	Targeted audience	Data collection methods	Results
	Administrative burden on Ministry	Implementation/enforcement	Capacity	EPA	Interviews	Managed jointly with Islamabad administration and local police stations
		Control and monitoring capacity	Capacity	EPA	Interviews	Only three EPA officers are currently carrying out inspection visits to various areas within ICT. EPA reported a need for more staff vehicles and at least 20 more inspection officers for enhanced enforcement.
		Cost of free distribution of alternative bags	Cost	MoCC	Interviews	Distributed with the support of partners who funded the campaigns

II. Analysis of Plastics Policies in the EU and Their Relevance for Pakistan

1. Relevance of the EU experience

Given the urgent need for action on curbing plastic pollution, it is important for Pakistan to consider relevant options and learn from experiences elsewhere. While every national situation is different, the EU has been a leader in waste and plastics policy and implementation, as well as in initiating the transformation to a circular economy. Therefore, there is much to learn from its experiences, positive and negative.

The EU has developed a wide range of policies, legislation and initiatives over several decades for general and product-specific wastes, including various types of plastics. Most EU legislation has been through directives and targets implemented through the national legislation of Member States. There has been diversity in approaches and levels of achievement, dependent on national situational and other factors, but there are many success stories. Extended producer responsibility (EPR) has been a major strategic approach to waste management, usually by some form of levy. While helping to increase recycling, EPR has had mixed success in other objectives, for example, incentivising change in packaging design. EPR approaches are currently under review.

In the case of plastics, the EU's production reached 62 million tonnes in 2018, which is one-sixth of the global plastic production [4]. The EU also reported collection of 29.1 million tonnes of plastic waste for treatment. In contrast to Pakistan, Europe has policies which set targets for plastic management. These have helped a number of Member States to report post-consumer plastic recovery rates (diverted from landfill) of nearly 100%. It should be recognised, however, that such high diversion rates have often relied on waste to energy. Also, it cannot be assumed that all plastic waste recorded as 'exported' for recycling ends up being recycled, given widespread evidence of poor recycling practices in some recipient countries.

Plastic waste remains a major EU as well as global challenge. Many forms of plastic waste are inherently difficult or impossible to recycle, and the Chinese ban on plastic waste imports has severely impacted the market for recycled material. The COVID crisis added to recycling difficulties as low oil prices lowered the price of virgin plastic relative to recycled material. Clearly, recycling is one option but not a simple panacea for the plastic problem. A more holistic circular-economy approach is needed, applying incentives where possible and bans or other regulatory controls where necessary to protect the environment.

As part of its pioneering circular economy development, the EU has developed a strategy for plastic waste in the circular economy. The EU's Action Plan for a Circular Economy offers learning opportunities for Pakistan to embark on this route.

This analysis, therefore, involves extensive review of available literature on EU plastic strategies to contextualise the lessons for Pakistan's plastic waste management strategy.

2. Current EU processes for plastics

In 2015, the European Commission (EC) adopted the **EU Action Plan for a Circular Economy** and committed to “prepare a strategy addressing the challenges posed by plastics throughout the value chain and taking into account their entire life-cycle”. Progress was made in 2017 when the EC decided to work towards the target of ensuring that all plastic packaging is recyclable by 2030.

In April 2015, the amended **Directive 2015/720 (EU, 2015) on lightweight plastic carrier bags** advocated Member States to “take measures to achieve a sustained reduction in the consumption of lightweight plastic carrier bags on their territory”. Such measures aimed to ensure an annual consumption of a maximum of 90 lightweight plastic carrier bags per person by 31 December 2019 and 40 per person by 31 December 2025, and/or the levying of charges on lightweight plastic carrier bags before 2019 at the point of sale of goods or products. In addition, the Directive established reporting obligations on the annual consumption of lightweight plastic carrier bags.

The management of plastic starts at the consumer level where a sensitised community with changed behaviours supports the interventions. Eurobarometer surveys showed that 74% of the citizens were concerned about the effects of plastic on health and 87% on the environment, hence strongly supporting the interventions [5] (see Figure 2).

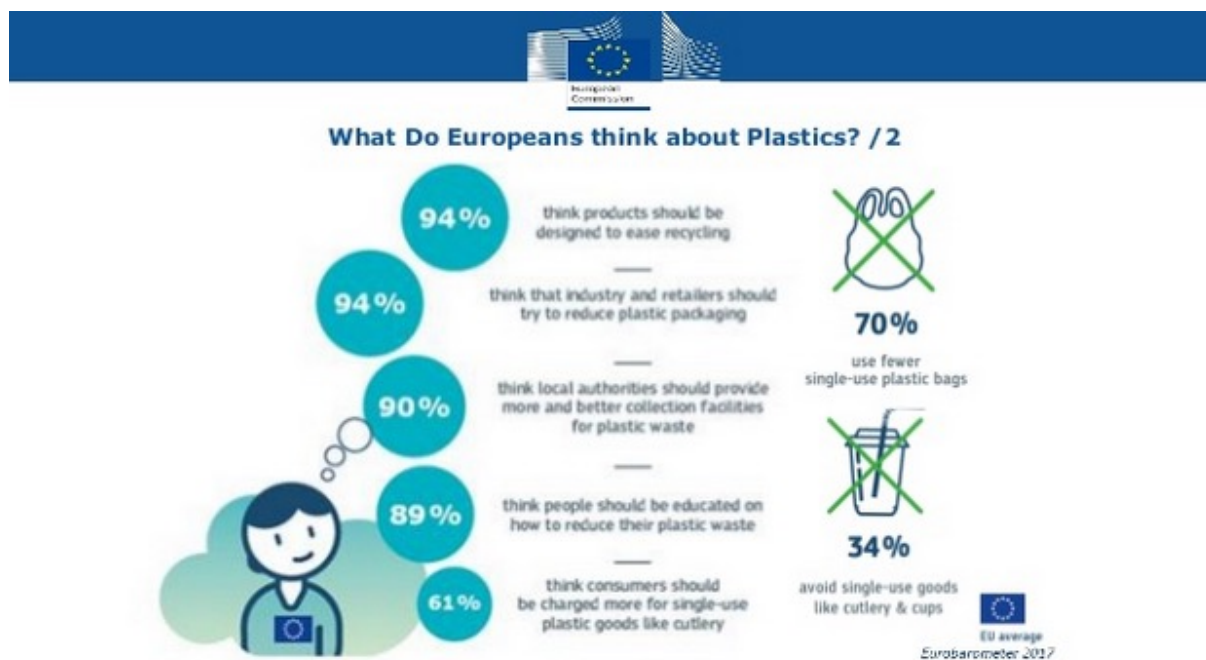


Figure 2 European Attitudes to Plastic

Considering the importance of plastics to the economy, and also the environmental problems caused by the way plastics are produced, used and discarded, the EU reiterated the importance of waste prevention in the **Waste Framework Directive EU 2018/851**. To capture the economic benefits of a more ‘circular’ approach, the revised directive highlighted plastic waste prevention as a specific priority for waste management in the context of a circular economy. The European Environment Agency (EEA) is required to publish a periodic report on waste prevention every two years to record the progress of each Member State on the transition towards a circular economy.

In 2018 the EC published **A European Strategy for Plastics in a Circular Economy**, aimed at decoupling waste generation from economic growth. The strategy also outlined measures and timelines for member countries to achieve the targets and pledges that the EC will act on so that all plastic packaging is reusable or recyclable in a cost effective manner by 2030. The year 2018 also saw a revision of Europe’s two most important directives -- the Waste Framework directive and the Plastic & Packaging Waste directive for packaging -- which had to be implemented by all EU Member States by 2020. They are part of a circular economy package and represent a fundamental paradigm shift in packaging policy. The focus is no longer on renewables or resource efficiency but on achieving a circular economy in which the value of products, materials and resources is maintained in the economy for as long as possible. Just reducing the weight of packaging is no longer considered packaging-waste prevention; instead, there is a push for packaging materials that are effectively recycled.

Key elements of the circular economy package relating to packaging are:

a) New ambitious recycling rates for overall packaging and packaging material have been set for 2025 and 2030 that need to be achieved individually by all EU Member States but not across EU (see Table 1).

Table 1 EU Recycling Targets (in %)

Recycling targets	Overall Target	Plastic	Wood	Ferrous metals	Aluminium	Glass	Paper cardboard
2025	65	50	25	70	50	70	75
2030	70	55	30	80	60	75	85

b) The way recycling rates are counted has radically changed. Only packaging waste that is effectively recycled can now be reported as recycled, which means collection is no longer the same as recycling. Energy recovery from incineration is not the same as recycling and therefore can no longer be counted as recycling. Only what is not lost during incineration, that is, material that will be subsequently recycled, will still be included in the recycling rates.

c) Packaging will have to be designed for circularity. Extended Producer Responsibility, where the producers who put the packages on the market provide the main financial contribution for the collection and sorting, has been around for a while. EPR will now be modulated based on end-of-life cost, providing real financial incentives for products that are easily recyclable, reusable or repairable. This will reshuffle cost among materials.

d) Products that are difficult to recycle or that are not recycled will bear a significant cost burden. Packaging strategies will need to be reassessed to be acceptable for the market going forward.

While most materials of value are recyclable, plastics from packaging and other single-use and limited-life products have much lower levels of recycling. The lesser recyclable material is either landfilled, exported to countries with poor environmental standards, or dispersed into the global environment via rivers and oceans. The COVID crisis has made plastics recycling even more difficult. The low oil prices made recycled plastic uncompetitive against virgin material. Unless recycled plastic can be pelletised to its original material, the technical and chemical barriers deem it appropriate only for downgraded applications.

The problem of single-use plastic is likely to increase if the global petrochemical industry proceeds to greatly increase production. The EU Plastics Strategy and Single-Use Plastic Directive (2019/904) [1] recognises the problems of plastic pollution and the limitations of plastic recycling. Table 2 summarises features of the EU Plastics Strategy.

Table 2 EU Plastics Strategy: A Summary

Directives	Tools and Targets
Waste Package Reform: Directive (EU) 2018/851- Amending the Waste Framework Directive (2008/98/EC)	<p>New targets for reuse after collection or recycling:</p> <ul style="list-style-type: none"> • 55% by weight by 2025 • 60% by 2030 • 65% by 2035 <p>Minimum operating requirements for EPR</p> <ul style="list-style-type: none"> • Coverage: Cost of separate collection, transport and treatment, data gathering and reporting • Distribution of costs: <ul style="list-style-type: none"> • EPR established before 4/7/19: 50% • EPR established after 4/7/19: 80%
Waste Package Reform: Directive (EU) 2018/850- Amending the Waste Landfill Directive (1999/31/EC)	<p>By 2030, waste suitable for recycling or other recovery will not be disposed of in landfill</p> <p>By 2035, the amount of municipal waste disposed of in landfills will be reduced to 10% or less of the total amount of municipal waste generated</p>
Waste Package Reform: Directive (EU) 2018/852- Amending the Packaging and Packaging Waste Directive (94/62/EC)	<p>Member States shall take measures to encourage an increase in the share of re-useable packaging</p> <ul style="list-style-type: none"> • Deposit return system • Qualitative or quantitative targets • Economic incentives • Minimum % of reusable packaging placed on the market every year for each packaging stream • Recycling target for plastic of 50% by 2025 and 55% by 2030
Ports Reception Facilities Directive	<ol style="list-style-type: none"> 1. Indirect fee to deliver waste at port 2. Prohibition on dumping plastic at sea and requirement for criminal penalties 3. Requirement for fishermen to take all reasonable precautions to avoid losing gear 4. EPR with eco-modulated fees for fishing gear 5. Reporting requirements for lost fishing gear 6. Increased inspections of fishing vessels

Directives	Tools and Targets
Single-use Plastic Directive	<ol style="list-style-type: none"> 1. Reduction: Food containers, cups, cigarette filters 2. Ban from 3 July 2021 on products that have alternatives available in the market: cotton buds, cutlery, balloon sticks, polystyrene containers and products from oxy-degradable plastics 3. Product requirements: Cap attached to bottle, 25% recycled content in PET bottles by 2025 and 30% by 2030 4. Labelling requirements: Sanitary pads, tampons, wet wipes 5. EPR: Costs of collection, transport, treatment, clean-up and awareness raising for food containers, beverage containers, tobacco products, wet wipes, light-weight plastic carrier bags 6. Awareness raising measures 7. 50% collection and 15% recycling targets for fishing gear 8. Separate collection: Achieve targets of 77% by 2025 and 90% by 2029 for all beverage bottles with a capacity of up to 3 litres.

Aim
<ul style="list-style-type: none"> • Changes in product design for durability, reuse and recyclability • Higher levels of collection and recycling • Four-fold increase in recycling capacity (baseline 2015) • Phase-out of substances that hamper recyclability in plastics • Successful market for recycled plastics • Decoupling plastic waste from growth • Reduction of marine litter • Innovation and better understanding to prevent microplastic pollution

3. Plastic waste management in EU Member States

According to the latest European Environment Agency (EEA) annual report, waste prevention programmes have been officially adopted by 31 EEA countries: the EU Member States (except Cyprus) and also four non EU countries that are members of the EEA (viz., Norway, Iceland, Switzerland and Turkey) [6].

The policy measures taken by these countries fall under regulatory, market-based, financial, voluntary and informative instruments. They can be divided into consumption reduction targets, market restrictions, product design requirements, marking requirements, extended producer responsibility, separate collection objectives, and awareness raising measures. Since the focus of the report is to contextualise the best practices for Pakistan, the following discussion will mostly cover the instruments relevant to Pakistan’s plastic problem (see Figure 3). For each of the measures, an initial assessment is made on their potential for Pakistan.

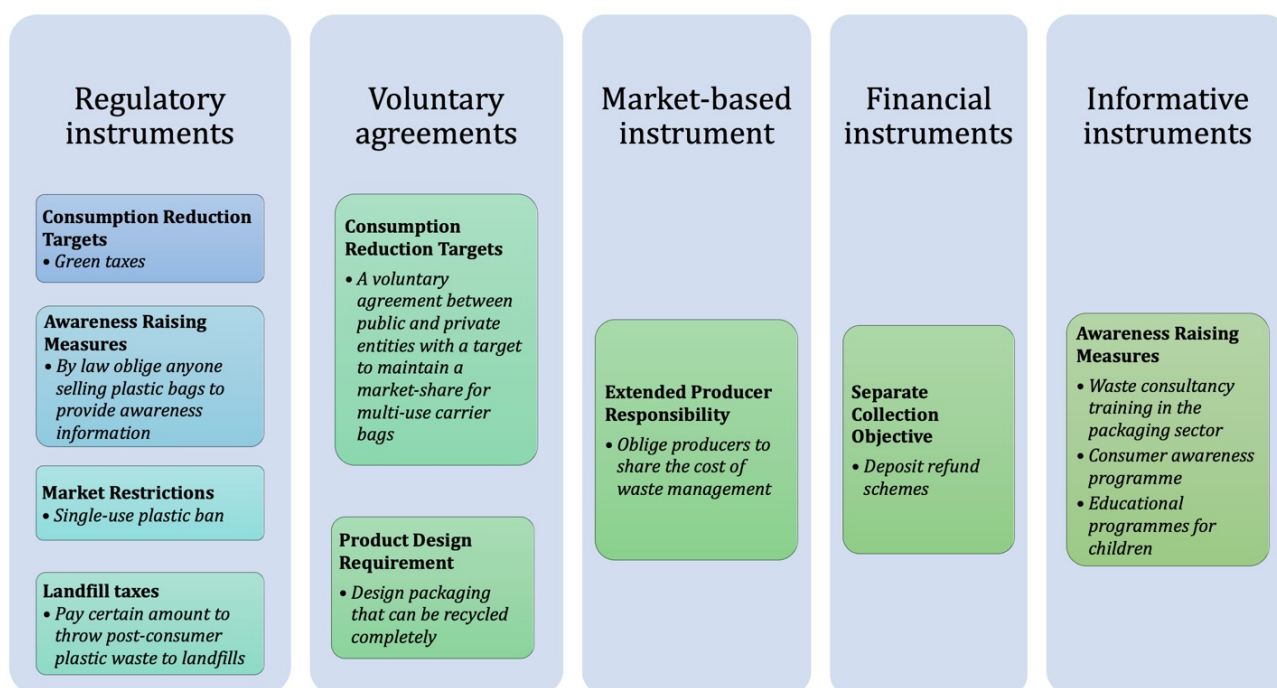


Figure 3 Instruments Relevant to Pakistan's Plastic Problem

3.1. Consumption reduction targets

This measure requires Member States to set national targets to reduce the use of plastics, like plastic bags, while making alternative products available. This measure has been implemented through regulatory instruments and voluntary agreements in member countries (see Table 3).

Table 3 Examples of Instruments for Consumption Reduction

Country	Policy instrument	Comments	Outcome
<i>Regulatory instruments</i>			
Denmark	Green taxes on packaging and plastic bags	Consumers are paying DKK 2 3.50 per bag. The profit for retailers is in certain cases around DKK 1 per bag.	The introduction of the tax halved consumption from around 800 million bags to 400 million bags, which amounts to around 80 bags per person annually.
<i>Voluntary agreements</i>			
Luxembourg	A voluntary agreement between the Environment Ministry and Valorlux (association of producers and importers of packaging material)	Multiple-use 'Eco-sac' carrier bag introduced with a target to maintain a market-share for multi-use carrier bags of at least 60%	Saving of 300 million disposable shopping bags. 3,738 tonnes of plastic, 8,313,680 litres of oil and 1,000 tonnes emissions of CO ₂ equivalent, linked to the production of disposable shopping bags, have been reduced annually.

If we consider application of the measures taken in Europe, Pakistan can phase out the single-use plastics used in restaurants and hotels with voluntary agreements between restaurants, suppliers and the Ministry of Climate Change. The restaurants and hotel chains could thus improve their sustainability performance and the government could further boost the success of such measures by legislating minimum targets for restaurants and hotels and instituting Sustainability Achiever awards. The restaurants could conduct waste audits and, with the help of the MoCC, set voluntary targets for the phase-out of single-use plastics. Take-away restaurants could later be added to the voluntary scheme when they could promote the 'bring your own cutlery' concept.

Globally, inexpensive alternatives to single-use plastics are available, for example, edible plates made of a flour mix of jowar (sorghum), rice and wheat; ice cream cups made from banana leaves; and jute bags. These alternatives can easily be adopted by a country like Pakistan where skilled labour is cheap. Therefore, keeping the suppliers in the agreement will facilitate the process of procuring eco-friendly alternatives.

3.2. Market restrictions

Market restrictions seek to forcibly end the sale of specific types of products. Such regulatory measures have also been implemented in Europe to ban some types of single-use plastics, for example plastic bags, as part of the implementation of the Plastic Bags Directive (see Table 4). With the implementation of the Single-Use Plastics Directive, which targets 10 specific items, more experience will be collected on the effectiveness of this measure. From 3 July 2021 onwards, the sale of the following plastic products is banned in EU: cotton-bud sticks, cutlery, plates, straws, stirrers, and sticks for balloons. Cups, food and beverage containers made of expanded polystyrene are also banned.

Table 4 Example of a Plastics Ban in the EU

Country	Policy instrument	Comments	Outcome
<i>Regulatory instruments</i>			
Romania	Law	Light-weight plastic bags (<50 µm) and very thin (<15 µm) with a handle banned in stores and supermarkets from 1 July 2018. The sale of such bags was banned from 1 January 2019. Fines from RON 15 000 - 25 000 (c. EUR 3 000 - 5 000)	Not reported

A similar ban on single-use plastic has been implemented in Islamabad, Pakistan. The scope of the ban covers the manufacture, buying and selling of single-use plastic carrier bags. Evaluation of the ban is still pending and may highlight flaws as well as successes. However, as noted above, there was a huge backlash from the plastic industry which was forced to shut down.

3.3. Extended producer responsibility

Based on the 'polluter pays' concept, EPR is a market-based instrument that obliges producers to share the cost of waste management and incentivises them to develop alternatives to plastics. It aims to provide stimulus to manufacturers to redesign their plastics-based products to be low-impact, and also seeks to engage them to 'close material loops' by making them responsible for the (previous) end-of-life phase, ideally by collecting, reusing and recycling products.

Adopting EPR, therefore, seemingly helps promote a circular economy that relies on plastics only where necessary. However, if plastic-rich waste cannot be recycled, 'energy recovery' through burning is often an alternative, albeit one with detrimental environmental effects. Therefore, rather than encouraging manufacturers to invest in eco-design and material alternatives, this policy can also incentivise incineration. Modern combined heat and power recovery plants (CHP plants) can use waste plastics together with other high calorific input materials. This provides a source of heat and power and is the most used way to dispose of plastic waste in Europe. Pakistan has the capacity to domestically develop CHP plants at a relatively low cost, and these can serve to deliver additional capacity to the national grid. Recovered plastic can also be used for Refuse Derived Fuel (RDF) as a raw material for industries and thermal plants. Pakistan could adopt this measure with a lot of options available domestically. One of the examples of the consumption of RDF is in DG Khan Cement that uses RDF in its cement plants as an additive fuel with coal. Under an EPR scheme, industry would be responsible for setting up a corresponding system and infrastructure.

However, to minimise waste streams EPR does not function as a standalone policy and needs to be flanked by effective monitoring as well as other economic incentives, such as taxes, to be effective. In Germany, for example, EPR for packaging waste has been implemented for decades but there has been an increase in per capita packaging waste as it still generates returns for companies to package and pollute more. Therefore, the success of EPR is linked to other measures taken to make the system self-sustainable, which could include:

1. Creating quality standards for secondary plastics
2. Encouraging certification in order to increase the trust of both industry and consumers
3. Introducing mandatory rules on minimum recycled content in certain products
4. Reducing VAT on recycled products.

3.4. Deposit refund schemes

Deposit refund schemes are systems where consumers buying a product pay a small amount of money which is reimbursed when they bring the container to a collection point once they have finished using it. The container can then be recycled and transformed into secondary raw materials. Deposit refund schemes on plastic and glass bottles increases the incentive to reuse the bottles and reduce the temptation to litter (see Table 5).

Table 5 Example of a Deposit Refund Scheme in the EU

Country	Policy instrument	Comments	Outcome
<i>Financial instruments</i>			
Norway	Deposit refund	Scheme for PET beverage bottles. Refunds can be made via one of 3,500 reverse vending machines - 93% of the total packaging collected is via this channel. The remaining 7% is collected manually by one of 11,500 registered collection points. Consumers get approximately €0.10 back for a 330ml plastic bottle or can, and approximately €0.26 for a large two-litre plastic bottle.	A recycling rate of 97% is accomplished from all the packaging that is registered through this system

PepsiCo recently launched Pakistan’s first ever reverse vending machine for plastic bottles [7]. This option was targeted by PepsiCo in collaboration with the Ministry of Climate Change under Clean Green Pakistan Movement that is designed to not only encourage public to recycle but also to raise awareness among them about the benefits of plastic recycling. This model will be observed for two months by WWF, and based on the assessment, the initiative will be expanded to other cities [8].

3.5. Awareness-raising measures

Providing information to consumers can help to reduce consumption. Responsible consumer behaviour and getting people to handle their litter responsibility is crucial to implementing any plastic management solution. In the past, certain measures have been taken by not only the government but also private entities to inculcate responsible consumer behaviour (see Table 6). Through these measures, consumers were made aware of how the use of plastics is posing a threat to the environment, and therefore of the need to reduce plastic usage.

Table 6 Examples of Awareness Raising in the EU

Country	Policy instrument	Comments	Outcome
<i>Regulatory instruments</i>			
Sweden	Law	Anyone selling or giving away plastic bags should also provide information about how plastic bags affect the environment and how consumers can reduce their consumption.	One year after this law was introduced, consumption declined by 35 %, according to the Swedish Trade Federation.

Country	Policy instrument	Comments	Outcome
<i>Informative instruments</i>			
Austria	-	Waste consultancy training in the packaging sector, through the packaging coordination centre	Still under assessment
Poland	-	Developed and implemented a database dedicated to products, packaging and waste management that will enable monitoring of waste prevention.	Still under assessment
Slovenia	-	A consumer awareness programme for the reduced use of lightweight plastic bags and educational programmes for children.	Promoted the issue of waste prevention at the consumer level.

Similar awareness campaigns have been started by corporations like Coca Cola and PepsiCo in Pakistan to meet their sustainability agendas. These campaigns targeted at consumers, seek to close the loop by not only investing in novel product development but also address the plastic waste entering the waste stream through the end-users. At the same time, these corporations are contributing to the plastic stream by eliminating alternatives (like glass bottles) or by making them less available and attractive. Both Coca Cola and PepsiCo regularly lead brand assessment of waste clean-up initiatives, demonstrating the futility of “informing consumers” if, on the producer side, plastic-based products are continuously provided to the mass market.

In Pakistan, littering is culturally acceptable. Changing this norm would require rigorous and permanent awareness raising. Awareness raising was an integral part of the Islamabad single-use plastic ban. The assessment results after a year of imposition of the ban highlighted the importance of consumer awareness on plastic pollution to make it a success. The assessment also highlighted how the awareness activities conducted by the government with CBOs and NGOs after the ban was imposed has increased the knowledge of the public on the issue and has influenced their behaviour. Similar outreach programmes must be implemented in other cities as well to make citizens aware about plastic pollution and its consequences.

3.6. Other measures

Product design requirement

This measure requires companies to design their plastics keeping in mind the recycling option. The measure is applicable to the future manufacturing of plastics. In the context of Pakistan, voluntary agreements with beverage companies to design beverage containers that can be recycled completely, including the lid, will divert waste from landfills and dump sites.

Marking requirement

This measure should clearly inform consumers about appropriate waste management options for the product or waste disposal means to be avoided, and about the presence of plastic in the product. Product standards and green labelling standards are pre-requisites for this scheme.

Landfill taxes

Twenty EU Member States have landfill taxes in place that help drive waste away from landfill towards preferable alternatives. Among these, seven countries have banned post-consumer plastic waste from landfills, and have diverted high rates of plastics towards energy recovery.

These restrictions, when combined with other measures, can derive good results. For example, 'Pay-as-you-throw' schemes at the local household level charge households on the amount of waste they generate. This incentivises residents to sort waste, facilitating waste segregation at source. This scheme complements EPR and helps transitioning to a circular plastic economy. Figure 4 shows rates of plastics recovery in countries with landfill restrictions, and Table 7 shows the applicability of different measures to prioritised plastics.

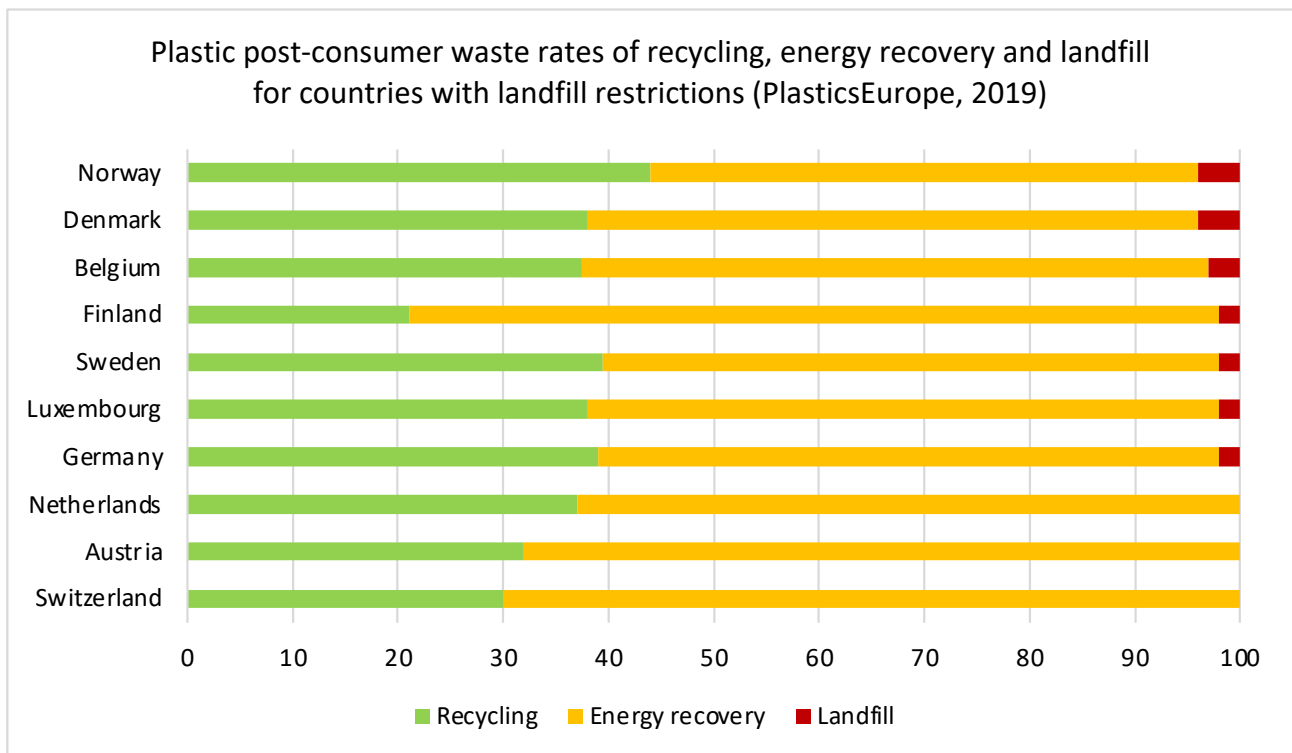


Figure 4 Examples of Plastics Recovery Rates

Table 7 EU Directives and Prioritised Plastics: A Summary

	Consumption reduction	Market restriction	Product design requirement	Marking requirement	Extended producer responsibility	Separate collection objective	Awareness raising
Food containers	✗				✗		✗
Cups for beverages	✗				✗		✗
Cotton bud sticks		✗					
Cutlery, plates, stirrers, straws		✗					
Sticks for balloons		✗					
Balloons				✗	✗		✗
Packets & wrappers					✗		✗
Beverage containers, their caps & lids			✗		✗		✗
Beverage bottles			✗		✗	✗	✗
Tobacco product filters					✗		✗
Wet wipes				✗	✗		✗
Sanitary towels				✗			✗
Lightweight plastic carrier bags					✗		✗
Fishing gear					✗		✗

4. Eurostat

This section describes a key element of EU waste policy and implementation, namely, the collection and provision of information.

The European Statistical Office, Eurostat, is responsible for provision of information to institutions of the EU and promotes harmonised statistical methods across Member States. The reporting on environmental directives, including waste directives, is scoped under Eurostat. Eurostat produces regular statistics on waste for the whole EU-27 economy, and on specific waste streams as directed by European Commission directives.

Two Directives especially relate to plastics waste data:

1. Guidance for compilation of data and reporting on Packaging and Packaging Waste Directive

The guidance highlights the methods to calculate and report calculation of packaging waste generated and recycled by Member States to be compiled by Eurostat. The updated data, after the amendment, is supposed to be reported for the year 2020 by June 2022 according to the format established. Reporting for key components must fulfil Article 6c(2) of Decision 2005/270, which states

“... composite packaging and other packaging composed of more than one material shall be calculated and reported per material contained in the packaging. Member States may derogate from this requirement where a given material constitutes an insignificant part of the packaging unit, and in no case more than 5% of the total mass of the packaging unit.”

Table 8 summarises the various calculation approaches in the Guidance.

Table 8: Approaches to Compilation of Data and Reporting

Key components	Approaches to calculate	Cross-checks and data gaps
Waste generation	<p>Packaging placed on the Market (PoM):</p> <ul style="list-style-type: none">• The data for waste generation should be gathered from relevant stakeholders in the country, such as extended producer responsibility schemes that register packaging placed on the market for compliance purposes.• If there are multiple schemes, data from all schemes must be gathered to ensure the amounts are not under-estimated.• Data could also be obtained from other sources, e.g., based on production and import statistics and factors to estimate the amount of packaging associated with these product flows.	<p>If PoM data is the primary method used, then waste analyses should be carried out at least once every five years in order to establish the type and proportion of packaging waste generated. This should be conducted at least once before the reporting of data for the reference year 2025, when compliance with the new recycling targets is first to be proved. These factors, relating to the proportion of different types of packaging in certain types of waste, should be used for the annual cross-checks.</p>

Key components	Approaches to calculate	Cross-checks and data gaps
	<p>Waste Analysis: Use waste composition analysis to calculate packaging waste generated. Waste analysis provides information about the amounts and types of materials in a particular waste stream. The results give a breakdown of the total composition of waste that has been sampled.</p>	
Recycling	<p>The total weight of waste recycled must be equal to the weight of waste at the Calculation Points given in Annex II of Decision 2005/270 and be obtained from relevant stakeholders in the value chain as necessary. Data should also be split into three columns depending on the location of the recycling activities (recycling in the Member State, recycling in other Member States and recycling outside the EU). Member States can include ferrous metal or aluminium from incineration bottom ash (IBA) in the recycled amounts.</p>	<p>Member States may apply Average Loss Rates (ALR) when measuring the amount of packaging recycled and state the methodology followed. ALR should only be used when no other reliable data on the weight of waste at Calculation Point are available, such as in the context of shipment and export of waste.</p>
Repair of wooden packaging	<p>Amount of repaired wooden packaging to be reported separately, and then reported amount will be considered for calculating the recycling rate by including it in the numerator and the denominator: $\text{Recycling rate} = (\text{recycling} + \text{repair}) / (\text{waste generated} + \text{repair})$</p>	
Recovery	<p>Energy recovery: Total weight of waste of each material type, where waste of that type has actually been subject to energy recovery Other recovery: Total weight of waste of each material type, where waste of that type has actually been subject to recoveries other than Energy recovery or Recycling (which includes composting/ digestion of bio-wastes as per the conditions set out in Article 6(a)(4) of Directive 94/62/EC)</p>	

2. Monitoring and reporting on the consumption reduction objective under Single-use Plastic Directive

Member States are required to utilise existing EU production and trade databases (PRODOCOM – statistics on the production of manufactured goods, and COMEXT – statistics on international trade in goods) managed by Eurostat to provide information on consumption reduction objectives until the database is updated to facilitate monitoring and reporting.

Under the directive, Member States will identify products, set targets for consumption reduction and implement measures to reduce consumption. For monitoring and reporting, Member States are required to apply the requirements on the economic operators who put selected products on the market to report on the amounts of such products in order to regularly measure the level of consumption of the single-use plastic products concerned.

5. Best practices

Gaps in schemes

Gaps in implementation have been identified since the different schemes were implemented to handle the waste stream. The quoted examples are not from the plastic industry but the scheme can be extended to manage plastics.

1 Surveillance of free riders

Free riders are businesses who benefit from the schemes without contributing an appropriate share of the costs. Three main sources of free riding practices were identified that a scheme must address to avoid glitches:

- Excessive fees for small producers, which disincentivises them to contract into the scheme
- Insufficiently precise definition of the scope, particularly regarding new products
- Trans-frontier and online trading as resellers, who are subject to EPR obligations, are not always aware of it, and/or do not have the take-back infrastructure.

In 2019, France took steps to tackle free riders by announcing new obligations for online platforms as part of the French Circular Economy Law. The Law requires online multi-seller platforms such as Amazon and Alibaba to ensure that the collection and recycling of packaging arising from products marketed and sold on such websites is properly financed (i.e., that sellers are EPR registered). The online platforms will, by default, be held responsible and take the EPR obligations from their sellers if they cannot prove this.

2 Gaps in reporting

The challenges in reporting have previously been mentioned and dealt with, not necessarily for the plastic stream but these ideas can be implemented for correct data collection.

EU Member States have Producer Responsibility Organisations (PROs) responsible for the design of schemes, ensuring target compliance, assisting companies in eco-design, data collection and reporting to national authorities. The composition of PROs varies from country to country to maintain compliance and transparency. However, a PRO should be a non-profit entity of industries involved under the planned scheme. In some cases, government officials participate with an observer status only. The reports set out by PROs are audited by independent third-party auditors, and when conditions of compliance are not fulfilled, sanctions ranging from fines to license withdrawal of PROs are applied. Some Member States have accreditation procedures for PROs defined by law through which an ad-hoc entity defines Terms of Reference (ToRs) for PROs, including sanctions in case a PRO does not comply.

3 Surveillance of PROs

Some examples of surveillance of PROs are as follows:

- Belgian transposition of the European directive on packaging has PROs from non-profit organisations that focus on just one statutory goal, that is, take back. Permits for the PROs also include provisions on data gathering, data quality, recycling effectiveness, transparency, controllability, performance of auto-control, the role of independent auditors, etc. The Interregional Packaging Commission gives permits to the PROs, undertakes inspections and aggregates data on the packaging system to report to the Belgian government.
- In Sweden, PRO members use an insurance system to ensure the financial safety of the EPR scheme. Producers who adhere to a PRO must pay an annual fee, an insurance premium based on the number of products sold, and on their recycling cost that will be used to cover the overall system surveillance costs.
- In 2008, the French PROs for packaging, Eco-Emballages, admitted having placed EUR 55 million (i.e., 20% of its global budget) in fiscal paradises, hence putting a non-negligible part of producers' contributions at risk. Following this, the French law introduced a State censor for all PROs. The censor particularly has access to all information regarding the PRO's finances.

6. Summary of findings

The main general finding from this report is that a mix of measures is likely to be needed in Pakistan, as in the EU. Also, systemic intervention is more likely to be successful than reliance on on-off bans that are difficult to implement.

The main specific findings from this report can be summarised as follows:

- It is projected that by 2025 Pakistan will be contributing 1.7% to the global mismanaged plastic, if business as usual continues. This will demand action to prevent plastic pollution in the country. A shared vision to innovate recycling and create a market for recycled plastic with cooperation among all key players in the value chain is, therefore, much needed.
- Pakistan can phase out the single-use plastics used in restaurants and hotels with voluntary agreements among restaurants, suppliers and the Ministry of Climate Change. The restaurants and hotel chains can improve their sustainability performance by taking such initiatives. The government could enhance the success of such measures by legislating minimum targets for restaurants and hotels, and by instituting Sustainability Achiever awards for them.
- Pakistan can adopt Extended Producer Responsibility with a lot of recycling options available domestically. For some plastic usage, for example in the health sector, only a few plastic alternatives are available. If this plastic-rich waste cannot be recycled, then energy recovery is an alternative. Modern combined heat and power recovery plants can use waste plastics together with other high calorific input materials. Pakistan has the capacity to domestically develop CHP plants at low cost, which could deliver additional capacity to the national grid. Recovered plastic can also be used for Refuse Derived Fuel as a raw material for industries and thermal plants.
- Relevant private sector organisations can steer Deposit Refund schemes to achieve their sustainability commitments. For example, Coca Cola Beverages, as part of a 'Tackling Plastic Pollution in Pakistan' project, partnered with WWF to install collection huts for plastic bottles across three malls for a month. These measures can be implemented permanently to support circular economy initiatives.

- Awareness raising was an integral part of the Islamabad single-use plastic ban. Similar outreach programmes must be implemented to make citizens aware about plastic pollution and its consequences. In Pakistan, littering is culturally acceptable and changing this norm would require rigorous and permanent awareness raising.
- The implementation of measures to achieve a circular plastic economy will open avenues for the plastic industry to develop a business case in environmental conservation. Moreover, this will contribute to sustainable consumption and production by promoting resource efficiency while managing the plastic waste.

7. The way forward for Pakistan

7.1. Policy framework

The first need for Pakistan is a national policy framework with immediate, medium-term and long-term objectives and targets addressing the technological, market, cultural and regulatory impediments to manage plastic waste in the country. The Ministry of Climate Change should establish a forum with the Chamber of Commerce and Industries, Pak-EPA, public sector organisations, plastic SMEs and other relevant private sector organisations to pilot a framework to set and achieve goals and objectives.

This forum will also help to minimise the communication gap between industries and environmental management authorities, and to develop innovative approaches to resolving environmental issues. The presence of concrete targets will help dictate the type of policy measures required, their relevance and the effort needed to implement them. The process of framework formulation should also include participation from the Pakistan Plastic Manufacturing Association to help steer the process positively, without threatening the industry.

7.2. Prioritising waste streams and improving waste management

- The first task under this head would be to collect baseline data on materials and manufacturing processes, transportation to markets, plastic waste generation streams, and costs of improper waste management.
- To help identify and prioritise plastic waste streams based on types and use in order to set explicit targets for an action plan, the tasks involved would be to:
 - Analyse the efficiency and effectiveness of collection, treatment and disposal systems with respect to plastic waste from all the streams, and formalise a collection/recovery strategy
 - Assess the industrial management's commitment to environmental sustainability, current resource-use practices, sustainability plans and procedures, and capacity to implement the circular economy business models
 - Identify the gaps and opportunities, and
 - Identify the businesses, CSOs, INGOs/NGOs working in the recycling sector, to make them part of the plan.

- The prioritisation for plastic prevention should be given to most impactful plastic types and uses like plastic products designed for single-use or for a very short-time use, and to non-recyclable products. Learning from the EU, it will be beneficial to conduct research on the types of plastic found in the litter and rank the items on the basis of their abundance. Such prioritisation would help direct and structure prevention efforts, reduce environmental impacts more quickly, and also show significant results in terms of reducing the waste generated.
- Pakistan is not a key producer of plastics but plastic import has seen a dramatic increase in the fiscal year of 2021 (24.5% increase). It is, therefore, important to realise that the importers (enterprises and large corporations) are legally bound to pay for environmental externalities. Economic assessment of environmental damage and estimate of the negative externalities are pre-requisites for such initiatives to meet the objective requirements of socio-economic and environmental benefit balance.

7.3. Specify policy instruments with monitoring directives

Most of the measures adopted in Europe are soft measures, such as, voluntary agreements and informative instruments. These primarily aim to increase cooperation and exchange of information among stakeholders across the plastics value chain. Some national initiatives set out targets and monitoring schemes.

Similarly, based on the targets and baseline data the MoCC, with the members of the forum, should identify the relevant stakeholders that can be involved in implementing plans for plastic waste management, and propose actions for improving management. These include improvements in collection, sorting and recycling infrastructure, encouraging the establishment of markets for recycled plastics, developing innovative materials and feedstocks, encouraging smarter design, and reducing pollution caused by plastics.

The next step will be to define indicators for monitoring progress towards achieving the set targets, identifying successes and identifying challenges and gaps that need further action.

All these measures consider future plastic waste, but it is also important to deal with current plastic litter on land and in water bodies. Massive clean-up drives should be incentivised in the country to collect waste plastic. Collected waste should be immediately recycled with the help of the existing formal and informal sectors. This will open up the opportunity to formalise the informal sector, and also for SMEs to grow, thereby strengthening the recycling infrastructure, which should be a priority.

7.4. Sustainability and environmental stewardship

For the sustainability of the circular plastic economy, it will be important for the government to legislate opportunities for industry to facilitate the transition to a circular economy model and boost the market demand for recycled products.

Pak-EPA and Pakistan Standard and Quality Control Authority (PSQCA) should formulate industry-specific quality and environmental standards based on legislation. These should aim to maintain the minimum quality of products manufactured, create markets for such products and publicise environmental reports regularly for the credibility of businesses.

Other measures could include:

- Conceiving a grading system to provide incentives/rewards/tax rebates to the relevant industries and entrepreneurs according to their performance in compliance with industry and environmental standards, which would also encourage the adoption of recycling models.
- Awarding Sustainable Business Labels to the complying establishments will further encourage industries to voluntarily develop circular economy business models in the competitive environment.

7.5. Other lessons

Making alternatives available in the market before putting bans on certain plastics will increase the acceptance of bans. Pakistan is still struggling to provide alternatives for certain products like packaging for poultry products. The lack of alternatives discourages consumers from following the plastic ban.

Learning from good practices in Europe, it would be wise to begin by banning plastics less than 50 μm thick to keep the plastic economy running in the country. However, this would require plastic to be collected separately after use, and recycled. This means that Pakistan cannot rely on a single measure at this point in time. The plastic waste problem needs hybrid solutions that include:

- Raising awareness of the public and all sectors involved on plastic pollution to encourage consumer behaviour change
- A holistic waste management strategy with waste segregation at source for maximum plastic recovery, and
- Policy measures for prioritised waste streams like market restrictions on certain plastics, design and marking to easily track and recycle, and EPR.

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III. Final Recommendations



Lessons for Pakistan for effective plastic waste management

- Up-to-date and applicable guidelines and legal frameworks for controlling plastic pollution should be introduced by the environmental protection agencies (federal and provincial) with a holistic approach to industrial sector development including environmental sustainability, skills development, export promotion and technology upgradation.
- Together with public sector organisations, a single forum should be formed with Pakistan Plastic Manufacturing Association, Chamber of Commerce and Industries, Pak-EPA, Provincial EPAs and other relevant private sector organisations to minimise the communication gap between industries and environmental management authorities, and to resolve environmental issues.
- Value chain analysis should be performed to identify constraints and project opportunities, and for better planning of plastic pollution control scheme designs. The efficiency and effectiveness of collection, treatment and disposal systems with respect to plastic waste from all the streams should also be analysed.
- Active participation of NGOs, INGOs, academia and civil society should be ensured in project design and implementation. Technical working committees should be formed within the associations to strengthen knowledge management systems.
- Cleaner production practices in the industrial sector should be incentivised for early adoption of modern plastic treatment techniques and technologies.
- Environmental management systems should be established with a focus on plastic pollution. These should be compulsory for SMEs, along with mandatory capacity building of the workforce through training and workshops focusing on technology upgradation and hands-on skills development, especially for supervisors and operators.
- Proper indicators, baselines and concrete targets should be established to better monitor and evaluate the relevance, efficiency, effectiveness, impact and sustainability of planned interventions. The roles of stakeholders should be understood, and responsibilities clearly defined for each step of the intervention.
- Pak-EPA and other provincial environmental protection agencies should formulate industry-specific standards based on legislations, and should publicise environmental reports on a standardised computerised system for real-time data. The agencies should conceive a grading system to provide incentives/rewards/tax rebates to the relevant industries and entrepreneurs according to their performance in compliance with industry-specific standards.
- Educational resources, awareness material and compliance assistance tools should be prescribed for the use of community as well as small and medium businesses, and efforts should be made that they are applied in reducing plastic pollution.

Summary of Lessons for Pakistan for effective plastic waste management

Lessons	Responsible Agency	Outcome
Legal framework for controlling plastic pollution	EPAs (federal and provincial)	To form a holistic approach to industrial sector development including environmental sustainability, skills development, export promotion, and technology upgrading.
Formulate a single forum	Public sector with PPMA, CCIs, and other relevant private sector organisations	To minimise the communication gaps between industries and environmental management authorities and to resolve environmental issues.
Perform value chain analysis	MoCC with sector partners like UNDP, WWF, World Bank	Identify constraints, project opportunities, and for better planning of plastic pollution control scheme. Analyse the efficiency and effectiveness of collection, treatment and disposal systems with respect to plastic waste.
Incentivise Cleaner Production practices in the industrial sector	MoCC with Mol and provincial departments	Early adoption of modern plastic treatment techniques and technologies, and effectiveness of collection, treatment and disposal systems with respect to plastic waste from all streams.
Environmental management system for SMEs along with mandatory capacity building of the workforce	EPAs (federal and provincial)	Improving the physical aspects of the industries, e.g., technology upgradation and hands-on skills development especially for supervisors and operators.
Form technical working committees within the associations	Industries	To strengthen knowledge management systems. To ensure active participation of NGOs, INGOs, academia and civil society in project design and implementation.

Lessons	Responsible Agency	Outcome
Establishment of proper indicators, baselines and concrete targets	EPAs with PPMA, CCIs and other relevant private sector organisations	Monitor and evaluate relevance, efficiency, effectiveness, impact and sustainability of planned interventions. Define the roles of stakeholders and responsibilities for each step of the intervention.
Industry specific standards	EPAs (federal and provincial)	Incentivise Cleaner Production practices in the industrial sector.
Educational resources, awareness materials and compliance assistance tools	EPAs (federal and provincial)	Awareness on plastic pollution for community and small and medium business owners.

Note: CCIs: Chambers of Commerce and Industry, EPAs: Environmental Protection Agencies, MoCC: Ministry of Climate Change, Mol: Ministry of Industry, PPMA: Pakistan Plastic Manufacturers Association.

