

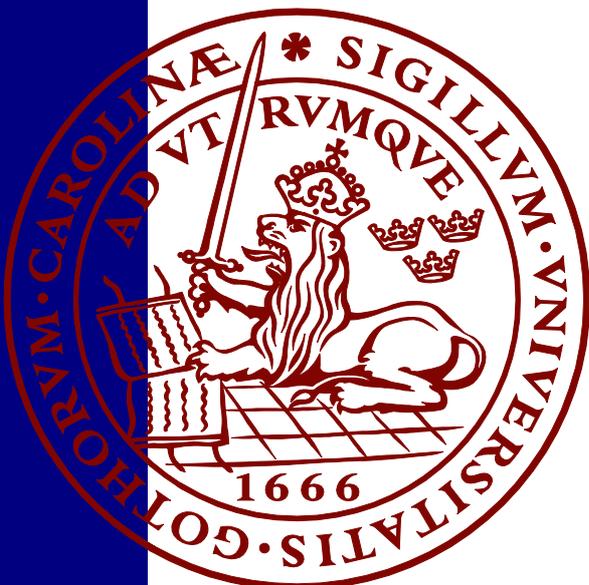
Will Plastic Ever Go Away?

An analysis of how social movements can shift the framing of the plastic issue from consumption reduction to production as the driver of the plastic problem in Taiwan

Hiroka Ka Ho

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A thesis submitted in partial fulfillment of the requirements of Lund University
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Supervisor: Turaj Faran, LUCSUS, Lund University

Abstract

Globally, the production and consumption of plastic has increased exponentially. As plastic items are produced using fossil fuels, the plastic industry is intrinsically tied to the petrochemical industry. One unique case of this dilemma lies in the petrochemical industry's role in plastic production in Taiwan. Despite its reputation for recycling, Taiwan is satiated with ineffective sustainability efforts and places the burden of responsibility onto the citizens. In order to fully solve the plastic problem, it becomes critical to understand which actors are involved and what is their role within the system. There is an obvious unwillingness of the industry to voluntarily stop production for the sake of environmental protection, as that would negatively impact their corporate interests, similarly this renders the state ineffective in these matters. This leaves the civil society domain to take the forefront, which is where the theoretical framework for social movement theory emerges. The central research question then becomes:

How can social movements shift the framing of the plastic issue from consumption reduction to production as the driver of the plastic problem in Taiwan?

This question is addressed in three parts. Initially three datasets gathered consisting of newspapers and reports from the Taiwanese Environmental Protection Administration (EPA) were triangulated to formulate the discourse of the problem. In order to do this, codes and themes from the data were chosen and tallied. Through the analysis, further sub-questions were identified from interviews conducted with involved parties regarding the neoliberal ideology of the current petrochemical landscape. A discourse analysis explores the problem analysis of various newspapers and reports from the Taiwanese EPA. The exploration of what structures and economic logic drive the lack of attention on petrochemical giants, namely neoliberalism was also considered. The findings illustrate how social movements should unpack the neoliberal ideology in order to confront the clashing interests of the environment and the economy. More specifically, how claims made by social movements must identify production, over consumption, as the main driver of the plastic problem. As well as how the framing of problems must have resonance to the public, to ensure support, participation, and mobilisation.

Key words: Plastic production, contentious politics, neoliberalism, framing, responsibility, mobilisation

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Abbreviations

CET: Citizens of the Earth Taiwan
CPC: Chinese Petroleum Corporation
DPP: Democratic Progressive Party
EPA: Environmental Protection Administration
FT: Focus Taiwan
GDP: Gross Domestic Product
KMT: Kuomintang Party
MOEA: Ministry of Economic Affairs
MRQ: Main Research Question
NGO: Non-governmental Organisations
NL: The New Lens
PB: Plastic Bag
PLA: Polylactic Acid
SMEs: small and medium enterprises
SRQ: Sub-research Question
SUP: Single-use Plastics
TN: Taiwan News
WUNC: Worthiness, Unity, Numbers, Commitment

1 Introduction

1.1 Research Problem

It was not until after World War II when the global wide-spread use of plastics began. Shortly after the concept of planned obsolescence or “designed for the dump” was devised as a means to increase material throughput and keep consumers buying (Leonard et al., 2009), single-use or so-called ‘disposable’ plastic products were designed for the dump. An estimated 8300 million metric tons (Mt) of virgin plastics have been produced to date (Geyer, Jambeck & Law, 2017). This intensive production has led to serious concerns regarding the resulting irresponsible dependence on these products, and plastics more generally. The problem with plastic is three-fold: firstly, the majority is derived from fossil hydrocarbons (fossil fuels), none of which are easily biodegradable and therefore will not be reabsorbed in a reasonable timeframe. Secondly, the chemical properties which give plastics its versatility and broad range of applications results in plastics unable to decompose organically, therefore causing huge environmental detriments. This versatility has skyrocketed the volume of usage on a global scale. Finally, the lack of proper management of end-of-life measures of disposal across the globe means that much of the plastic that has ever been produced, still exists, the majority of which can be found in landfills or oceans (Geyer, Jambeck & Law, 2017). In order to adequately address the scale and complexity of the plastic production problem, the global impacts must be analysed focusing on both the consumption and production of these fossil fuel legacies. This paper will explore how a relatively small nation, Taiwan, plays a role in the globalisation of the plastic problem and ultimately, how it could retire or drastically reduce its dependence on plastics.

Taiwan, a small sovereign island of over 23 million people, formally known as a Tiger Economy, is a major producer and exporter of plastics (Wade, 1989). Since the beginning of their history, politics has dictated much of the industrial and environmental positions it has taken. Built on the remnants of the industries left behind from the Imperial Japanese occupation (1895–1945), the Taiwanese petrochemical industry was born. Beginning in 1957, it was developed in various stages. During its infancy, the industry initially began with downstream production of finished plastic articles. Soon afterwards, as a result of direct state intervention by the Chinese Nationalist Party or Kuomintang (KMT) supplying initial capital-investment, Taiwan established its own local upstream production of petrochemical products (Chu, 1994). The major investment being a crude oil refinery and naphtha cracking facility. Shy of oil production, between the newly built cracker plant, refinery and the small and medium enterprises (SMEs) manufacturing plastics products, Taiwan’s petrochemical industry is one of

the most vertically integrated streams of plastic production in the world (Chu, 1994). Hence, the Taiwanese production line is a particularly interesting case study. SMEs proliferated as a means for the local populace to make their own gains from industrial development, as there existed a general lack of trust in the KMT to provide public goods (Arrigo & Puleston, 2006).

The strong export-led approach by KMT meant a significant proportion of the plastics produced were exported, adding to environmental problems at the global level. Addressing this industry would have far reaching effects beyond local health and environmental concerns. If Taiwan, as a country which has made significant capital investments in the industry can find a way to transition towards less reliance on plastics, it would be a true testament for the future of global plastic production.

Once known as a petrochemical kingdom, Taiwan has in recent years managed to remake its reputation by becoming one of the leading nations in recycling operation systems. Despite this, according to the statistics of the Bureau of Foreign Trade, plastics and articles thereof are still the third largest category of export after electrical equipment and base metals ("Industrial Production Statistics", 2020). The question then becomes, how did Taiwan manage to obtain such eco-friendly status while still producing over a total of 225 billion kilograms ("Industrial Production Statistics", 2020) of plastic and rubber articles for the export market? It seems as though Taiwan has managed to maintain certain narratives for what constitutes being eco-friendly without stepping back and reflecting on the bigger picture of the plastic production problem. Evidently, there is clearly a focus on recycling as the solution, as well as "encouraging" the reduction of using single-use plastic. However, how can Taiwan be solving plastic issues through recycling and encouraging its citizens to reduce their consumption, while production of plastics continues to rise?

There is an invisible mechanism that much of the current globalised economy is designed around. Neoliberalism is a belief system like any other ideology. It is both a political and economic system of thinking that first emerged in the 1970's and is best characterised by the belief that sustained economic growth is possible and necessary for elevating quality of life. Neoliberal economic policies operate in an understanding that the free market is most informative of how to direct human activity and determine the most efficient allocation of resources when there is minimal state intervention in economic and social affairs (Harvey, 2005). Since it is believed that the market can best inform economic decisions, economic indexes such as gross domestic product (GDP) is also seen as a good enough proxy to measure human progress (Astroulakis, 2014). However, since neoliberalism is not only a set of economic policies a lot of its ideology has managed to filter down to every sphere of human

action. This was not possible without a globalised push for such policies by powerful people such as Margret Thatcher and Ronald Reagan (Harvey, 2005).

Like in many other countries, people have come together to oppose such violations to the environment. Taiwan is no different with three main strands of environmental movements emerging in the mid-80s. Various actors have come together to try and tackle the plastic problem for some time, and although Taiwan has several achievements to speak of, it has been unsuccessful in fully developing a narrative that both the society and governments can stand behind. This has effected the movement's ability to mobilise and create the pressure needed for change.

1.2 Research Questions

Main Research Question:

How can social movements shift the framing of the plastic issue from consumption reduction to production as the driver of the plastic problem in Taiwan?

In order to answer the main research question above, a set of sub-questions will first need to be explored. To test the assumption that the reduction in consumption and recycling of plastic are the main ways in which Taiwan is responding to the growing global concerns around plastic and its pollution, we arrive at our first sub-research question:

Sub-research Question 1:

How are plastics problematised and understood by the Taiwanese people and the institutions involved?

This question mainly deals with the problem analysis of the plastics issue, or lack thereof. This leads to the second research question based on the inherent economic logics that have dictated the perpetuation of the industry. This has ultimately meant the government is unable to hold the petrochemical industry accountable for their role in the plastic problem.

Sub-research Question 2:

How has the ingrained neoliberal logic in Taiwan inhibited the move away from both the petrochemical and plastic production industry?

Since the political parties that have governed Taiwan have thus far been inadequate in protecting both the environment and people from such an industry, we look at other forms of

politics, namely social movements, to apply pressure on the government and market therefore acting as a mechanism for change.

Sub-research Question 3:

How can environmental movements mature the framing of the plastic problem in a way that targets the real drivers of the problem?

1.2 Relevance to Sustainability Science

The contributions made in this research is how social movements should unpack the neoliberal ideology in order to confront the clashing interests of the environment and the economy. More specifically, how claims made by the movement must identify productions as the main driver of the plastic problem. As well as how the framing of problems must have resonance to the public, to ensure support, participation and mobilisation.

From an environmental impact perspective, plastic recycling requires excessive quantities of energy, which in most cases is mainly sourced from grids powered by fossil fuels. Additionally, plastic degrades over time during the recycling process, unlike glass or metal which can virtually be recycled infinitely. This leads to the final major problem with recycling plastic, which is that recycled plastic products usually require a large ratio of virgin plastic to “upgrade” the plastic to maintain the desired properties and characteristics (Sedaghat, 2018).

1.3 Thesis Structure

In Chapter 2 the theoretical framework of social movement theory will be explored. In Chapter 3 the case study of Taiwan and its petrochemical industry will be presented, as well as introducing the presence of environmental social movements. Chapter 4 is the methods section in which the research design is illustrated along with the data collection procedure. In Chapter 5 readers will be presented with the data analysis and key findings. In the discussion, Chapter 6, the main findings will be rearticulated within the current literature on the topic. The limitations will also be discussed in this chapter. Chapter 7 holds concluding remarks and an outlook for future environmental movements in Taiwan.

2 Theoretical Framework

In this chapter, social movement theory will be introduced which encapsulated the theoretical framework for the research conducted in Chapters 4 and 5. To begin, social movements are evaluated as a form of contentious politics. Through investigating social movements theoretically and analytically in the context of this report, a greater understanding of how claims made by environmental movements in Taiwan is obtained. Finally, focusing on collective action frames and their importance for a movement.

2.1 Social Movements as Contentious Politics

Social movements are organised efforts by groups of people working to achieve a common political or social goal (Kolb, 2007). (Kolb, 2007) They are defined by a sequence of contentious demonstrations, performances and campaigns where concerted claims are made on others. Contentious politics is formed from the convergence of politics, collective action and these contentious activities. It is denoted as episodic, public and collective interactions among one or more makers of claims where the government is involved as part of the claim or is the object of such claim; and the claim, if realised, positively or negatively affects the interests of at least one of the claimants (Tarrow, 2013). Claims, or the messages of the movements, are demonstrated to the objects of the claim, power holders or the public, whose support legitimises any claims being made (Tarrow, 2011). Therefore, contentious politics in general seeks to change or fix some part of society which the claimsmaker identifies as problematic. Social movements are a distinctive form of contentious politics, the form which is most likely to emerge when governments must negotiate with the local population. While other forms of contentious politics such as rebellions or coups are more likely to emerge in less democratic landscapes (Tilly & Wood, 2013). Social movements have historically emerged during periods of change in political opportunities as an embodiment of the growing dissatisfaction of the status quo. Social theory discourse breaks societies into three social domains: (civil) society, political and economic. Social movements emerge within the (civil) society sphere in response to the inability of political and economic spheres to adequately deal with a given problem. They are a certain blend of collective action, referring to the sum of individual activities of a movement. Social movement theory makes the claim that movements can apply pressure to both the political and economic sphere and act as a mechanism for change .

2.2 Elements which Define a Social Movement

Social movements often include collections of different events such as petitions, declarations and mass meetings. The purpose can also be seen as linking claimants, object(s) of the claim and the public together, and the interactions between these three parties is a crucial component of a true social movement. Charles Tilly and Lesley J. Wood (2013) offers a synthesis of what three elements constitute a social movement: a *campaign*, *repertoire* and *worthiness, unity, numbers and commitment display* (WUNC):

1. A **campaign** refers to any organised public effort that is sustained and makes collective claims on target authorities.
2. A social movement's **repertoire** is conventionally discussed in terms of performance in line with Erving Goffman's work on dramaturgy (1956), which refers to the employment of combinations of political actions such as establishing special-purpose associations or coalitions, demonstrations and public meetings. It is the integration of these performances into campaigns that sets social movements apart from other forms of politics.
3. The final element, **WUNC**, is the public representation from participants which can be represented in the form of statements, slogans or labels. WUNC is also used as an indicator in social movement studies to determine whether the movement is growing and gaining traction. Conversely, if WUNC is decreasing, then the social movement is at risk of losing long-lasting results (Tilly & Wood, 2013).

Strength = Worthiness x Unity x Numbers x Commitment (Tilly, 1999)

The core of contentious politics is disruptive and its innate ability to disrupt against authorities. However, disruptions within society can cause uncertainty for a movement and could potentially be a point of weakness for oppositions to exploit. When a movement maintains a similar repertoire, over time the public performances become ritualised and if accepted, become more legitimised. This is paradoxical, as the lack of innovation in repertoire is often due to one or a combination of three processes. First is the lure of politics which draws activists to contained forms of political performances such as lobbying, publishing and elections that attract less committed support. Gaining political influence or shifting to operate in the realm of electoral politics can only be gained by sacrificing disruptive power. Second, disruptive power depends on participation rates where disruptive power increases with greater participation rates over longer periods of time. In addition to problems maintaining innovation in the repertoire, the final reason is that marginal (less committed) members of a movement often compose the majority, and tend to further reduce engagement and recede

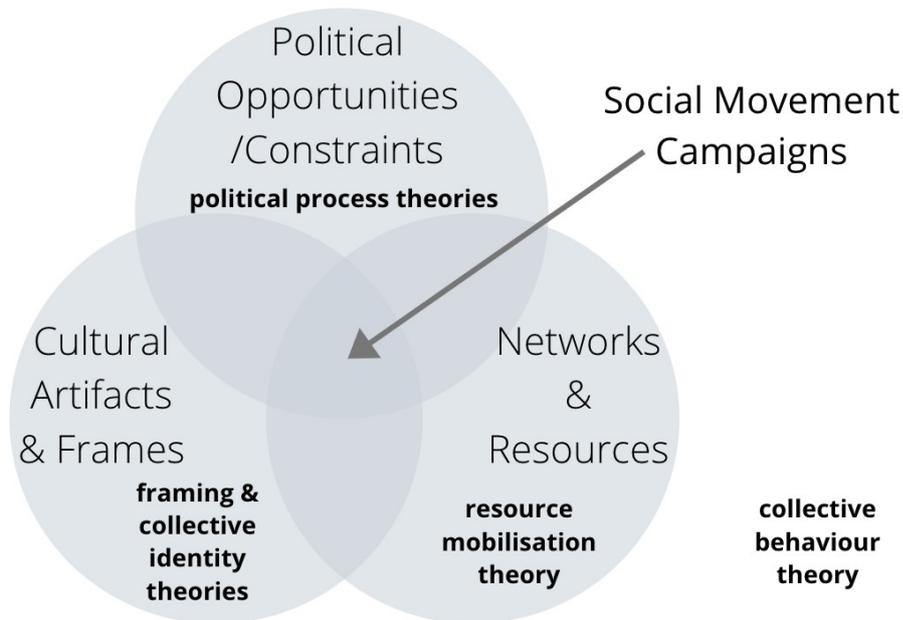
back into their personal lives (Tarrow, 2011). It can also become unappealing for less privileged members of a society, especially in the presence of strong opposition such as the police or unified government, as the participants' perception of what the movement is to gain are outweighed by potential personal losses. Leaving behind the most extreme participants which can often escalate into violent behaviour (Tarrow, 2011). Continuous innovation is needed to challenge authorities, encourage supporters and maintain public interest.

2.3 Theoretical Synthesis

More than the specific elements that make up any movement, are the theories which make up the foundation of social movements. The theoretical synthesis is a combination of prerequisite theories whose origins are not necessarily that of social movement theory but when integrated, is how social movements are currently understood and studied. First came the literature on *collective behaviour theory* stemming from the works of Marx whose work focused on mobilisation potential within the capitalist society. Leading to Lenin's perspective that mobilisation needs to be actualised by an elite group and not just an automatic process. Lenin's work led to the *resource mobilisation theory*, which focused on the role of formal networks and importance of resources for movements' ability to grow (McAdams, McCarthy & Zald, 1996). In the following two decades came the work on *framing and collective identity theories* and finally *political process theories*, much of which came from Tilly himself. The former was based on the works of Gramsci (1924, 1971) centering on the need to formulate consensus for goals, while the latter largely focused on the political conditions in which social movements emerge. Social movements are therefore understood as requiring a combination of *political opportunity*, *resources* and the correct *framing* to emerge and succeed (Tarrow, 2011). The contribution of this thesis is concentrated on the *framing* powers that social movements should use to mobilise the public.

2.4 Collective Action Frames

From what has already been discussed, social movements do not automatically emerge. With the right political climate, actors must also become agents that are actively and consistently producing and maintaining meaning for constituents, antagonists and bystanders (Benford & Snow, 2000). It is important that *framing* is not confused with or used interchangeably with ideology, which is a broader and relatively durable set of beliefs that determine not only political views but also ones' everyday life more generally. *Collective action frames*, on the other hand, are a function of amplification and extension of ideology or components of them. Therefore, ideology acts both as a recourse and constraint to collective action frames.



The Intersecting Elements of Social Movements & Underlying Theories

Figure 1. *Intersecting Elements of Social Movements & Underlying Theories.* Political opportunities/constraints stemming from political process theories, cultural artifacts & frames stemming from framing & collective identity theories and Network & Resources stemming from resource mobilisation theories. Converging at the middle is where social movement campaigns can be found to lie. Collective behaviour theory though influenced much of the other theories, does not directly influence social movement theory. Adapted from Tarrow, 2011. Author Compiled, 2020.

The core tasks of these frames are *diagnostic*, *prognostic* and *motivational*, which often leads most movement actors to problems either related to “consensus mobilisation”, dealing with agreement of the movement or “action mobilisation”, dealing with convincing participation (Benford & Snow, 2000). *Diagnostic framing* is often focused on forms of blame or responsibility, dealing with the consensus on the root of the problem. Or in other words, what is the problem, how can we change it and why should the public care? Note that successful framing of one movement to mobilise does not mean the same will work for another movement, and this is due to all the different context specific elements already discussed. Though studying the past could offer insight for future movements.

A mistake often made are limited *organisational frames*, or movement specific frames, that are exclusive and therefore alienating. These messages and movements are less likely to gain traction and establishment because of a rift in widespread public acceptance and support. A frame must therefore achieve *resonance* which is the credibility of the frame. The three pillars that hold up credibility are *frame consistency*, *empirical credibility* and the *credibility of frame*

claimsmaker (Benford & Snow, 2000). If these three pillars are not upheld by the movement it can cause fractures in public perceptions. Therefore problems in mobilisation and a general lack in public support as well as a point of weakness for oppositions to exploit.

3 Case Study Background: Taiwan, its Petrochemical Industry, & Environmental Social Movements

This section will provide an overview of both Taiwan's political development and how the petrochemical industry has evolved. Much of the literature that has studied the successes of Taiwan often fails to consider the environmental devastation that accompanied the economic success (Hsiao, 1999). Here social movements present in Taiwan will also be introduced and put into context. Social movement theory notes the importance of integrating history into our understanding of contentious politics as it calls attention to the changing political conditions that make them possible and fluctuations in its presence indicate the expansion and contraction of democratic opportunities (Tilly & Wood, 2013).

3.1 Historical background of Taiwan

Taiwan has a relatively short history, gaining its independence in 1945 after Imperial Japan was defeated in World War II. Shortly after gaining its independence, Chiang Kai-shek with his political party the KMT relocated to Taiwan after losing the government to Mao Zedong's Communist Party in the Chinese Civil War (1947-1949) (Hood, 1996). This was the beginning of the Martial law period, also known as White Terror Era, where authoritarian rule was enforced by Chiang Kai-shek (1949-1987) resulting in the unlawful convictions and executions of thousands of Taiwanese and Chinese democracy activists and other opponents (Grano, 2015). In the early years, the KMT took over industries such as the petrochemical industry leftover by the Japanese. However, the KMT never planned on staying. Their defeat and retreat was expected to be only temporary as they expected to return to China. This is evident in KMT policies for maximum extraction of resources and lack of concern for the environment, clearly driven for short-term benefits (Arrigo & Puleston, 2006).

Chu's (1994) study on the Taiwanese petrochemical industry offers a detailed overview of this time period. In the 50s and 60s, the KMT began to invest in the petrochemical sector by producing benzene under the state owned Chinese Petroleum Corporation (CPC). The KMT also began to produce products such as polyvinyl chloride and methanol using imported inputs. In 1960, the KMT began to implement policies which favoured export promotion over import substitution. By the latter half of the decade these policies proved successful and the export of labour-intensive goods were on the rise from the total share of industrial goods increasing from 46% in 1965 to 79% in 1970. In the late 60s, the state-owned CPC built its first naphtha-cracking plant. A cracker plant uses crude oil or natural gas feedstocks that are fed into a furnace and heated to break the chemical bonds into various lengths producing either

ethylene, propylene or other by products (Corkery, 2019). Those then become the feedstock for eventually producing plastics. The early 1970s marked the beginning of a period which saw a steep acceleration of the downstream growth of the plastics industry, leading to KMT demonstrating strides to build up the petrochemical sector. The second naphtha cracker was built and operational by 1975, with plans for a third and fourth one in 1973, operational in 1978 and 1984 respectively. In 1980, due to the second oil crisis, the construction of the

Sectors	Production	Input	Output
I	naphtha cracker	naphtha	petrochemical materials (or feedstocks)*
II	chemical materials	feedstocks	raw materials for – plastics† – man-made fibers‡ – synthetic rubbers
III	downstream	II's output	– plastic products – man-made fibers & textiles – rubber products

*Feedstock materials include products of naphtha cracking: ethylene, propylene, butadiene, and products from aromatics units, benzene, toluene, xylene (BTX). The three aromatics plants in Taiwan are also operated by the CPC.
†The six major plastic materials in Taiwan include PVC, LDPE, HDPE, PP, PS and ABS.
‡It mainly consists of PTA and EG for producing polyester, CPL for nylon, AN for acrylic.

Figure 2. Illustration of the vertically integrated streams of plastic production in Taiwan. Depicted are the three sectors (I,II,III) of production stages from naphtha cracking to downstream manufacturing of plastic articles. Figure from Chu, 1994.

fifth cracker was postponed indefinitely. Due to the industry being capital, energy, and pollution-intensive, it was considered no longer suitable for the state to continue investing in the industry. However, the change in the political landscape of Taiwan with the lifting of the Martial law and the proceeding reforms in government and economy that led to the economic liberalisation meant economic growth was again prioritised over environmental concerns. Evidently the plans for the fifth naphtha cracker were opened again for revision and later approved despite opposition from local environmental groups that were only able to postpone the construction until 1990. And another owned by Formosa Plastic Group was approved and built in 1993. It was also due to the closing of the first plant and the growing demand from sector II creating pressure for higher inputs from sector I (Chu, 1994). See the figure below which clearly illustrates the three sectors and corresponding stage of production, where the output of the previous stage is the input of the next stage.

Since the early 1950s, the government has been heavily involved in all industrial activities. The state made capital-intensive investments in chemical materials (sector II) development as a means to keep up with the growing downstream plastic products (sector III). Taiwan's success in the global market was due to its adoption of export-promotion policies and reliance on the free market. However, contrary to true neoclassical policies, the government played a crucial role in the development and promotion of this specific industry. Even after the initial investments in crackers plants, the government continues to offer subsidy loans to all sectors of production (Arrigo & Puleston, 2006). The government's strategy was to compensate for Taiwan's lack of technological advantage by offering subsidies, as well as supplied below market price raw materials to the petrochemical industry (Chu, 1994). Studies show that there were large increases in rates for the subsidies in 1982 as a necessary response to rescue the sector from the oil crisis. These rescue operations were common despite the point for them to be temporary. This meant that even after the recession, these industries continued to enjoy a plethora of support from the government and therefore could develop very comfortably (Arrigo & Puleston, 2006).

The petrochemical industry began by enjoying the benefits of a strong state steering in the development of industry. After the democratisation of Taiwan in 2000 and the subsequent privatization and deregulation, those processes proved to only strengthen the industry and weaken the state's autonomy (Ho, 2005) gaining power and leverage outside of state rule, which will be further evident in the Chapter 5.

3.2 Production in Taiwan: Strength of the Petrochemical Industry

It is difficult to map the true extent of the petrochemical industry in Taiwan due to a number of different factors. Firstly, much of the metadata for the different statistics on production are incomplete or have not been made publicly available, making it impossible to determine what types of plastics are counted for. Secondly, because petrochemicals and articles thereof are used in many other industries such as textiles, electronics, construction it is hard to ensure that all plastic products are accounted for. Nonetheless, the attempt will be made to capture the size and importance of this industry.

Overall, the industrial sector accounts for about 35% of Taiwan's GDP (MOFA, 2018). According to the trade statistics database by the Ministry of Economic Affairs (MOEA), of the industrial sector, the category consisting of plastic and articles thereof and rubber and articles thereof is the third largest export industry at just over 7% ("Industrial Production Statistics", 2020). However, this figure is not inclusive of the plastics used in other industries that use plastics (see figure 3). There are in fact various other categories of manufacturing which

involve the use of plastic material not accounted for. Figure 3 has been compiled as a means to further illustrate the breadth of the plastics in the industrial sector as a whole. There may still be categories that have been missed due to lack of available data. The data is inclusive of all the plastic related categories available through the national statistics database (see appendix 1).

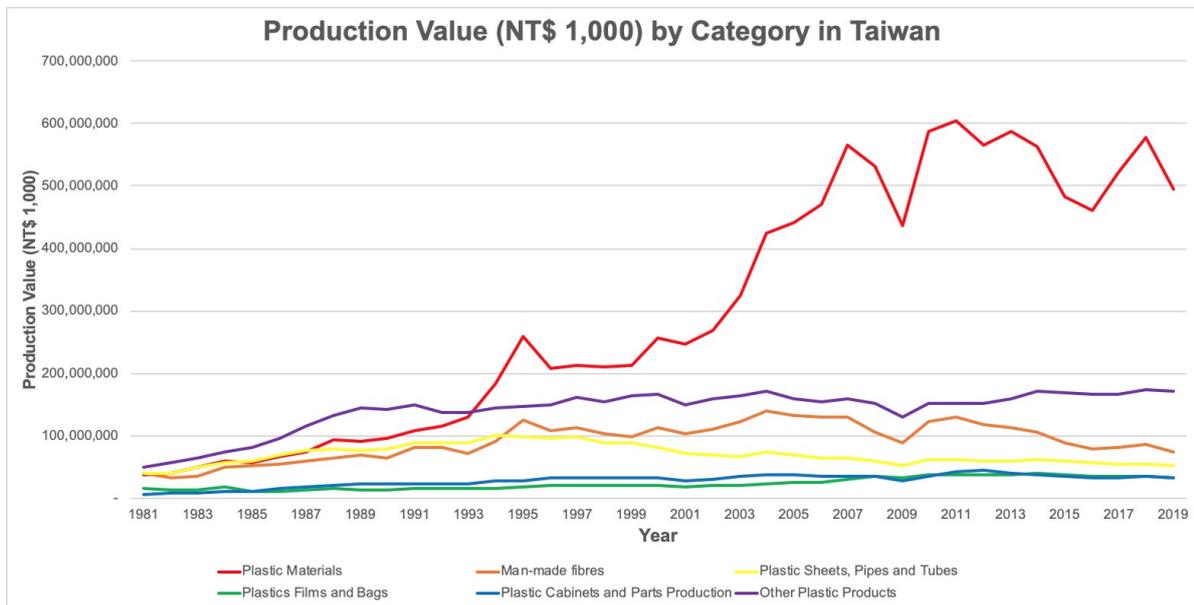


Figure 3. Production Value in \$1000 New Taiwan Dollars (NT\$ 1000) by Category in Taiwan. Data retrieved from Ministry of Economic Affairs, Department of Statistics, Industrial Production, Shipment & Inventory Statistics Survey - Product Statistics. Author Compiled, 2020.

The strength of the petrochemical industry is not only based on its long-standing history but also due to its economic productivity for Taiwan. The strength of the industry can therefore be inferred from its growing revenue over time and employment (Figure 4). Employment can also be used as a proxy as it shows the dependence on this industry for economic stability and a means of income, which can inhibit opposition towards the polluting industry.

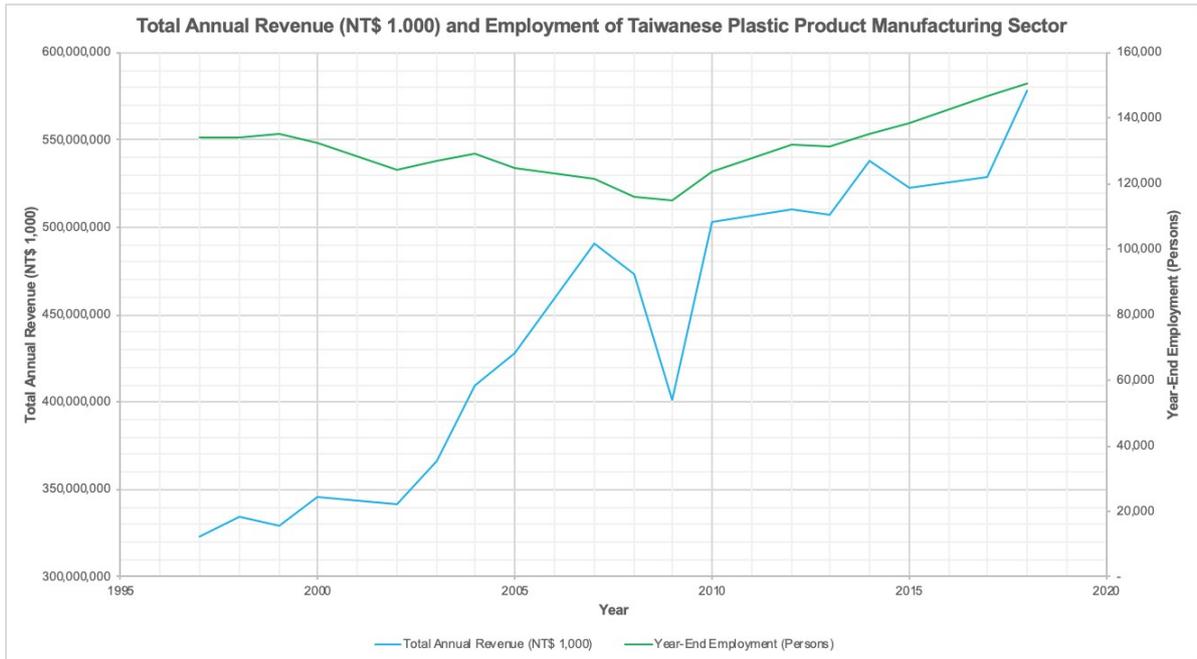


Figure 4. Total Annual Revenue (NT\$ 1000) and Employment of Taiwanese Plastic Product Manufacturing Sector from the year 1997 to 2018. Data retrieved from the Ministry of Economic Affairs, Department of Statistics, trade statistics database. Author Compiled, 2020.

3.3 Environmental Social Movements Under the Regime Change

Several works have already been produced which tie the political and economic history to the social movements that have emerged in Taiwan (Hsiao, 1999; Arrigo & Puleston, 2006). Under Martial law, the KMT’s strict rule prevented much of the reactions to environmental violations caused by rapid industrialisation. However, towards the end of the era, the tension between the KMT and the local population that bore the brunt of the environmental and health issues had gained enough friction into pushing some into action (Arrigo & Puleston, 2006). Since the mid-1980s Taiwan has seen the emergence of three distinctive environmental movements: *anti air-pollution*, *anti-nuclear* and *nature conservation* (Hsiao, 1999). These movements are interlinked in many ways, and studying them could offer the plastic-free movement insight of successful frames and repertoires, although successful framing of one movement does not automatically mean successful mobilisation in another (Benford & Snow, 2000). The end of the Martial law era marked the beginning of political opportunities for environmentalists that were fed up with the state of the environment under KMT rule. The relaxing of authoritarian rule also greatly reduced the cost of collective action. Coupled with movement for democracy and demands for a higher standard of living, the KMT were forced to add more environmental protections laws and regulations, marking the start of some environmental governance procedures (Ho, 2005).

The year 2000 marked the beginning of democracy in Taiwan. This power transfer and regime change to the Democratic Progressive Party (DPP) gave many great hope. Many of the environmental movements had been aligned with DPP values for more than a decade, and was part of the reason the KMT were ousted (Ho, 2005; Arrigo & Puleston, 2006). Many hoped that this regime change would bring environmental protection into institutionalised politics (traditional politics) and that it would be the beginning of environmental governance in Taiwan. However, democratisation also significantly changed the business-state relationship (Ho, 2005).

The presence of these three movements means that there is already a nucleus for social movements in Taiwan and the public are familiar with disruptions created by them. The relatively long presence of them however suggests that the movements have yet to achieve their given goals, or that their goals have changed over time. This thesis, focusing on framing, suggests that moving forwards the claimmaker of the plastic-free movement must be able to apply and align their message to existing movements' claims and incorporate their support. Hypotheses from studies suggest that a larger range of problems covered by a frame also means that more social groups can be included in the claim leading to greater mobilisation capacity (Benford & Snow, 2000). The hypothesis however, only holds when the various problems incorporated in the frame are in fact have synergies to one another which in this case all share the fundamental link of tackling and opposing environmental degradations. Even the anti-nuclear movement, typically approached as an energy problem, is considered an environmental movement as it had been framed as undermining the living environment and ecosystem (Hsiao, 1999).

It has been two decades since the start of democracy in Taiwan, but what has become of the hopes created from the power transfer to the DPP? To give a fair assessment, the DPP had enormous weight both in terms of actualising democracy for the first time and inheriting decades of corruptions from the KMT, which was until that point the main ways in which the government, industrial sector, and society more generally had operated (Ho, 2010). In the

early years under DPP, there was great increase in industrial operation transparency, activists' access to information, and channels of dialogue. However, only a few years into term, in a hurry to stabilise its shaky transitions, the DPP opted to compromise and co-exist with economic forces rather than promoting sustainable alternatives (Arrigo & Puleston, 2006), demonstrating its true colours of how environmental governance will look like for the years to come. Without sustained mass mobilisation, there is little faith in either of the political parties

(the DPP or KMT) to govern Taiwan in a manner that is environmentally prioritised, as seen by their reluctance to postpone the building of the fifth cracker plants. Environmentalism became another political tool to be used during election campaigns or to bash the opposite party (Arrigo & Puleston, 2006).

4 Methods

This chapter contains the research design formulated and followed for the research portion of the paper. Then, the data collection method of each of the four datasets collected will be described as well as introducing the contacts for the interview section of the research. Followed by the specific methods used to treat the data, content analysis and framing.

4.1 Research Design

In regards to the plastic discourse of the given context, the most common narratives or frames for dealing with the plastic issues first must be established. The hypothesis that there is a strong tendency for soft measures like consumption reduction and recycling, without any regard for other drivers of the plastic problem. There is a gap in understanding the plastic problem that needs to be filled, before the problem can be efficiently dealt with.

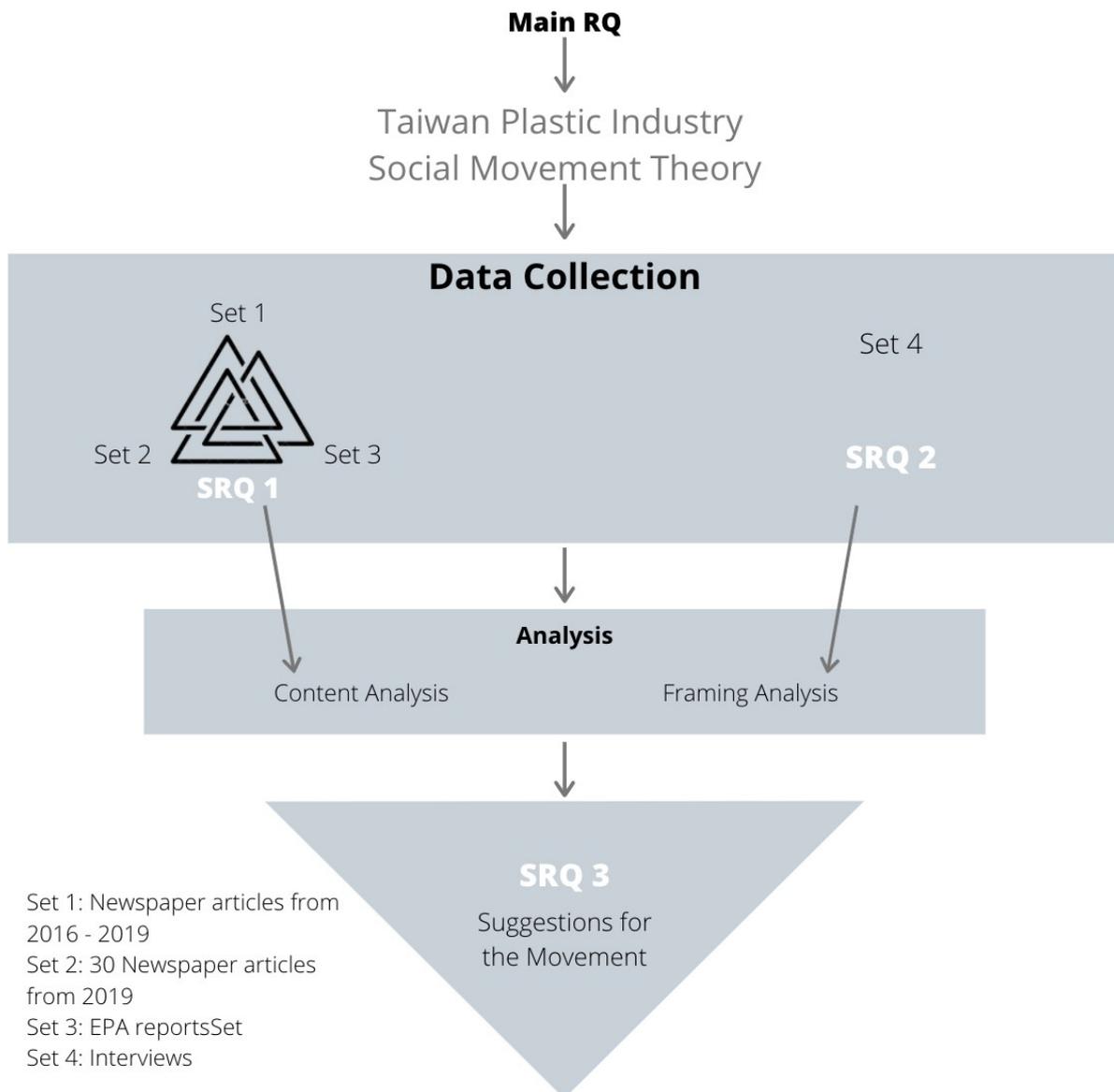


Figure 5. Illustration of Research Design. RQ stands for research question, while SRQ stands for sub-research question. Main Research question: How can social movements shift the framing of discussion from consumption responsibility to production as the driver of the plastic problem in Taiwan? SRQ1: How are plastics problematised and understood by the Taiwanese people and the institutions involved? Dataset 1, 2 and 3 were triangulated using a content analysis method. Findings used to inform SRQ2: How has the ingrained neoliberal logic in Taiwan inhibited the move away from both the petrochemical and plastic production industry? Dataset 4 was treated using a framing method. Findings from SRQ1 and 2 were used to inform SRQ3: How can environmental movements mature their framing of the plastic problem in a way that targets the real drives of the problem? Informing suggestions for social movements. Author Compiled, 2020.

4.2 Data Collection

The datasets used for analysis were selected based on Hajer's (2006) discourse analysis procedure. The procedure was designed as a means to collect different perspectives on a given discourse. Its process functions as a narrowing tool starting from gaining the entire range of narratives by means of performing *desk research*. Then, *helicopter interviews* and the semi-structured *interviews of key players* conducted provide a more in depth look for discovering more obscure narratives. These steps were combined due to the limited time offered by various organisations and actors. The former process included the triangulation of two sets of newspaper analyses from 2 different newspaper repositories (datasets 1 & 2) and a complete review of 264 official reports published by the Taiwanese Environmental Protection Administration (EPA) since 1998 (dataset 3). For the interviews (dataset 4) three categories of actors were identified in line with the spheres of society provided by social theory; political, economic and the civil society.

4.2.1 Dataset 1: Articles Over Time

In Taiwan it was important to keep in mind the political orientation and agenda of the newspapers themselves as there is still a relatively strong KMT-DPP divide (Wang, 2020). The three newspapers offering a variety of political and corporate influences, were selected. Focus Taiwan is the English section of The Central News Agency, founded by the KMT in 1924 while they still ruled China, and relocated to Taiwan in 1949. The same year, Taiwan News was established as the first English newspaper, but later bought by I-Mei Foods Co., Ltd in 1997 ("Taiwan News | About Us", 2019). I-Mei is a large foods and beverage corporation thus changing the statue of the newspaper from independent to having corporate interest, as well as officially changing its editorial policy in favour of the DPP and pro-Taiwan independence editorial line. Thus potentially offering the opposing political perspective. While the New Lens has no political or corporate ties, and remains independent. In order to obtain the changing narrative over time, if any, the first relevant articles found from each newspaper were selected for analysis spanning four year (2016-2019) (see figure 6). Even still, a 2016 article could not be obtained for all three newspapers. Eleven articles were compiled.

4.2.2 Dataset 2: 2019 Articles

Google's news search engine was used searching the phrase "Taiwan plastic" to compile a list for the second newspaper analysis which includes thirty most relevant articles of 2019. A deeper view of current narratives also offers space for more obscure narratives to be put

forward as the media reporting on such issues over time (Hajer, 2006). For this dataset, the political orientations of the publishers were disregarded in the collection.

4.2.3 Dataset 3: EPA Monthly Reports

An EPA is easily considered the most relevant environmental governing body of any democracy, and arguably has the most power and authority to achieve environmental protection, giving the justification to treat such documentation as the official environmental ongoing of the state. The Taiwanese EPA, founded in 1998 by the KMT and has published a monthly environmental policy report since, 264 reports in total. These reports were used to gain an overview of the political discourse around plastic over time.

4.2.4 Dataset 4: Interviews

Ideally, the major actors for interviewing would be petrochemical companies, government parties and non-governmental organisations (NGOs). However, due to the lack of engagement from the actors in the petrochemical industry it was not possible to obtain an interview with any of them. The process of reaching out to the different actors began with the use of search engines and social media platforms to obtain a list of potential actors to interview.

The environmental NGOs Wild at Heart Legal Defence Association (henceforth denoted as 'Wild') and Citizens of the Earth Taiwan (CET) both operate in various environmental movements including the plastic-free movement. Although NGOs do not encompass an entire movement they are often the first point of contact when studying a movement, and can often provide rather detailed views and details of the movement thus far. Interviewing NGOs was an important step not only to corroborate the findings from the previous data collected, but also to establish the current existence of a nucleus for social movements in Taiwan. Xavier Sun and Robin Winkler were the two contacts obtained from Wild, and Hanlin Li from CET.

The contact for the interview with the Taiwan Green Party was the Secretary General Rita, Zhuqin Zhang. It was founded in 1996 as a means for environmental activists to move into institutionalised politics (R.Z. Zhang, personal communication, March 7, 2020). The founders believed that in order to amplify the work of environmental movements, policies in favour of those movement's claims needed to be adopted into government operations. Unfortunately, the Green Party has yet to win an official seat in the government. Since they have been unsuccessful in winning the majority of the government, the political sphere is currently unable to facilitate the kind of change demanded by the movement.

Finally, although none of the large petrochemical corporations responded to any request for interviews, one with the Industrial Development Bureau was obtained instead, with Bin Yu from the Sustainable Development Division. Although this division falls under the jurisdiction of government organisations, they operate closely with the industrial sector as a whole, offering those perspectives indirectly.

4.3 Methodology

4.3.1 Content Analysis

The DS 1, 2 and 3 were treated using the content analysis method to determine the problem analysis of plastics. According to Hsieh & Shannon (2005) there are three main methods for a content analysis with slightly different analytical processes, all of which consist of coding the data (newspaper articles and EPA reports) into categories. The *conventional approach* is the process where the codes are derived from the data directly, whereas for the *direct approach*, codes are predetermined based on theory and literature on the topic. Finally, the *summative approach* is a quantitative analysis, focusing on summing up the frequencies of codes to explore usage. These three approaches offer a good basis for handling data, and can be used in conjunction with each other as well as with other methods.

The *conventional approach* was used for dataset 1. First, all eleven articles were read, during which key themes and words were highlighted and extracted into a table separated by years (see appendix 2). Then, codes were created based on the extracted data:

- Plastic bags
- Environmental impacts
- Business/economic policies
- Organizations/agencies
- Soft measure solutions
- End-of-life measure: disposal method
- Incentive for reductions
- Alternatives materials
- Miscellaneous

Next, the *actors*, *problems* and *solutions* of each article were identified. *Actors* include any actors of change, responsible parties or possible enforcers. *Problems* in each article are defined by the article and does not necessarily mean what is problematic for environmental sustainability. *Solutions* are responses to the problems found in the article. Then a problem analysis was formulated.



Figure 6. Dataset 1 Diagram. Year, news article titles, name of newspaper and article codes used in results and analysis. Author Compiled

Dataset 2 was treated using two processes. Similar to date set 1, the newspaper articles (see appendix 3) were first read and key themes and terms were extracted into a table (see appendix 4) then coded using the same codes from dataset 1. By applying the same codes it is possible to see how much has changed in the narratives from previous years, and how many different concerns are incorporated in the plastic discussion in 2019. Additionally, for this process the *summative approach* was employed, as it is easier to treat a larger dataset using this approach. Then, the *direct approach* was used to generate codes based on previous knowledge gained through literature reviews of the main actors or groups that have been identified as holding the responsibility for the plastic problem or for creating the change. Note, articles that did not problematise plastic were not treated in this section of the analysis seeing as the responsibility of the identified actors is what was of interest. Those actors are:

- Petrochemical industry
- SMEs
- Retailers/businesses

- Civilian/consumers
- Recycling companies
- Government institutions

The EPA reports were handled using the *conventional approach*. Each of the reports were scanned for two key terms: *plastic* and *petrochemical* as these two terms would include any entry relevant to this study. The format of the reports are similar to a newsletter, therefore the titles of any entry obtaining one of the key terms were extracted into a table. Out of the 264 reports, 81 reports had zero entries that applied to plastics or petrochemicals and were therefore excluded at this point. There were 354 titles that contained more than one key term. Forty-eight codes were first obtained from the titles, then divided into the categories of actors, problems, and solutions (Appendix 5).

4.3.2 Framing

The foundational theories discussed in Chapter 2 pertaining the core functions of frames offer the theoretical formulation for the importance of achieving the correct frame in order to mobilise participants (Benford & Snow, 2000). The same is true for framing the plastic problem in a way that will resonate with the public. The way in which the problem is framed will determine what solutions are put forwards.

The interviews were recorded then transcribed using Otter.ai, an internet software program into text. The text is what was used for Dataset 2. First, main points were extracted from all four transcripts. Then those were organised into similar themes (Section 5.3) and analysed.

5 Results & Data Analysis

This chapter is divided into the sub-research questions proposed in Chapter 1. Each section is handled by a dataset and consists of a summary of the results and their related analysis. The findings of each sub-question are used to inform the consequent sub-question, which will be discussed in Chapter 6.

5.1 Sub-RQ 1: How are plastics problematised and understood by the Taiwanese people and the institutions involved?

5.1.1 Newspaper Analysis 1 (Dataset 1)

New South Bound Policy Analysis: 2016 articles identified six different actors which includes, the government, EPA, two NGOs and the Taiwan Plastic Industry Association. FT16 (Figure 6) identifies the reduced competitiveness of the current operations due to the increased labour costs in China as a problem, as well as the overall reliance on China for this industry. The solution to which is the New Southbound Policy which encourages these industries to venture to South and Southeast Asian countries where the labour is cheaper and are rich in natural resources. This also helps to solve the second problem by diversifying trade relations. The problem analysis stated in FT16 is the losing competitiveness of the plastic industry. Therefore Taiwan should abide by market logic to exploit less developed nations with undoubtedly less environmental regulations. The problem analysis here is that the plastic industry is not making enough of a profit.

Plastic Bag Ban Analysis: Articles NL16, FT17, TN17, NL17, NL18 and NL19 all focus on the plastic bag (PB) ban policy which was first implemented in 2002 by the EPA. The policy banned select businesses and retailers from providing free plastic shopping bags. Instead a levy for the PB was put in place. This topic is the most common in all eleven articles of this dataset. The PB ban policy was expanded in 2018, therefore prior media coverage was in anticipation of the expansion while NL19 offers a critique one year later. The problems most commonly identified in these articles are concerns for plastic waste disrupting marine ecosystems. Other problems identified are the high rates of PB consumption, which in Taiwan is 18 billion PBs annually, that recycling is not a full solution (Sedaghat, 2018), alternatives such as biodegradable plastic and paper have their own end-of-life concerns, and that there are still many problem retailers and businesses, such as traditional market and night markets, which are not included in the ban. Both of which are common venues for groceries and social

activities, notorious for their excessive PB usage. The solutions offered in the articles discussed recycling PB, fining those in violation of the ban, and changing consumer habits. These habits included reducing their consumption, bringing your own, recycling, and reusing. The problem analysis in these articles is generally that Taiwanese people consume too much plastic and that this should be addressed in changing habits through education. This is important to highlight because the main solution puts responsibility on the consumers and not the producers. The articles suggest solutions that focus on small retailers and consumers to keep the responsibility on them while little to no solutions are introduced for or towards the plastic producing industry.

Another issue to raise is that fines placed on retailers can be seen as unfair since PBs are the cheapest options for businesses (Chu, 1994). Additionally, the policy design includes warnings to first time offenders and fines of up to NT\$6,000 (US\$196) although the level of enforcement is unclear. Based on the articles, the warnings and fines were given during inspections carried out to determine the success of the policy and may not be entirely accurate years after the policy was imposed. On top of everything, the strong focus on PB as the culprit for the plastic problem has reduced the visibility of the actual problem on a macroscale (Villarrubia-Gómez et al., 2018). Figure 3 provides evidence that plastic film and bags account for the lowest value by category, suggesting that targeting PB provides the government the largest gain in public support with the least financial losses (Figure 3).

Straws Analysis: Articles FT18, TN18 and TN19 all focus on drinking straws. FT18 and TN19 do not identify any problems such that that article does not problematise plastics at all. The former boasts about a Taiwanese company's successes in international innovation fairs. An alternative straw made of sugarcane fiber and polylactic acid (PLA) that won several medals.

The latter commends fast-food restaurants for changing company policies to stop providing straws before the official EPA policy was set to start. However, in conjunction with TN18 it is possible to see that this was motivated by the introduction of new regulations banning single-use plastic straws. TN18 identifies six problems with plastic straws: high rates of consumption, straws are not currently recycled, microplastics, alternatives still require high energy inputs for recycling and they are not biodegradable. The solutions identified are the banning of plastic straws in some businesses, reducing usage, alternate materials, circular economy policies and sustainable business practices. The additional solutions from TN19 include a new lid design which eliminates the needs for a straw but this ignores the issue of overconsumption and plastics non-biodegradable characteristics (Geyer, Jambeck & Law, 2017). Similar to the PB problem analysis, the focus on banning straws from some select

businesses has gained a lot of publicity especially as Taiwan is home to bubble tea, a special drink enjoyed using a wider-than-normal straw. This particular focus is a niche issue and completely omits all other plastics as being part of the plastic problem. Additionally, a problem identified in NL17 states that Taiwan does not currently have the infrastructure i.e. compost fields, to deal with alternatives made of bioplastics or PLA at the end-of-life stage, meaning they would either be confused as plastics and enter the recycling line which contaminates the whole batch or incinerated (X, Sun & R, Winkler, personal communication, March 7, 2020).

Packaging Analysis: FT19 focuses slightly more broadly on plastic packaging in general, this is a slightly more obscure culprit in the plastic narrative. It identifies Greenpeace, a set of large food and beverage retailers and the United Nations as actors. It offers a host of problems including, lacking comprehensive systematic plans for phasing-out plastic packaging, ineffectiveness of companies implementing their own policy and lack data on packaging usage. The solutions set forth by Greenpeace is an index by which those retailers are graded against and promoting reusable packaging. This article points out the lack of changes being made by powerful international nation-wide distributors to influence and act as a catalyst for these positive changes. These retailers are in a key position which could both apply pressure in the supply chain and change the consumption practices and still bear the financial weight of more sustainable practices.

Over the four years the codes extracted during the content analysis process saw each year's set of articles include more and more aspects from the codes. In 2016, the articles did not include words or themes for end-of-life measures, alternative materials, incentives for reduction or miscellaneous. In 2017 and 2018; business/economy policy and alternative materials; and environmental impacts and miscellaneous categories were missing respectively. This suggests that the narrative around these issues are developing over time to include more and more aspects, even though the problem analysis had stayed relatively stagnant and underdeveloped (see appendix 2).

5.1.2 Newspaper Analysis 2 (Dataset 2)

Table 1. Dataset 2: Codes and frequency of articles pertaining the themes based on codes directly derived from the articles.

Codes	Articles Frequency
Plastic bags	8
Environmental impacts	19
Business/ economic policy	18
Organisations /agencies	7
Soft measures solutions: consumption habits /usage reductions	25
End-of -life measures: disposal method	9
Incentives for reductions	19
Alternatives materials	8
Miscellaneous	19

From an environmental perspective the frequency at which PB is specifically discussed as the main culprit in newspapers are too high as, the hope would be that the discussion of PBs in 2019 would have moved on. Especially, as this discussion has hardly progressed to include all plastic consumer goods or include looking at the mechanism that makes PB possible in the first place. Additionally, the only environmental impacts that are discussed are concerns on the marine ecosystem and air pollution, twice respectively. The articles essentially all make one point that they end up in waterways and risk being ingested by marine life, which is a very basic level understanding of negative impacts plastics have on the environment.

The topic range pertaining to business/economic policies finally started to expand on the ways in which businesses should aid in the transitions to reduce plastic consumption. Article 12 (Appendix 3) even states that “waste-reduction efforts in Taiwan still rely heavily on consumers, and plastic-producing giants remain unleashed” (Su, 2019). The EPA is most cited for much of the data on the topic and enforcement. However, the EPA’s actual power in

decision making and environmental governance should be critically examined, which will be further explored in Dataset 3.

Overall, there is still a heavy focus on consumption reduction as the solution, whether it be the retailers or consumers responsibility. As well as a heavy focus on just a handful of plastic articles. In Taiwan where plastic is prevalent, the question must be asked, how much of a difference are PBs and straws making in the grand scheme? In addition to the reduction narrative, the rates of recycling for specific plastic articles are a common concern. Some articles have pointed to recycling companies as falling in their responsibility to keep up with materials that are in common circulation. The large focus here is not accompanied by any narrative about production. Articles are also critical about the lack of recycling infrastructure for alternative materials that have been coming to the market.

There are three main incentives for reducing plastic use that have been identified in this dataset: financial, reputation, and legal. Most relate to the fines which could be charged for the retailers that violate the PB or the straw ban. There are several counts of internationally recognised accords and concerns that play a crucial role in applying pressure to maintain the reputation that Taiwan has obtained as the research shows thus far that Taiwan's efforts have been focused on placing a levy on PB rather than providing them for free. This might be a frame for the anti-plastic movement to exploit as well, indicated by their push for consumer and retailer responsibility over reduction of supply from the start. The final incentives are legal ones against petrochemical giants after losing lawsuits for violating pollution regulations, but this should not be seen as a common incentive.

Alternative materials are discussed in eight of the thirty articles, however, it is clear from the articles that there is still an obvious not a full understanding about their relative sustainability compared to traditional plastics.

Table 2. Dataset 2: Codes and frequency of articles that both problematised plastics and identified the actors responsible for the plastic problem.

Codes	Articles Frequency
Petrochemical industry	1
SMEs	5
Retailers/businesses	23
Civilians/consumers	17
Recycling companies	2
Government institutions	10

In Table 2 are the results of which actors should hold the responsibility for the various problems identified in the articles. None of the seven articles discussing petrochemical giants explicitly says plastics are the culprit nor do they articulate them as key players in the problem. The only article that mentions “plastic-producing giants” as culprits, in article 12 (Appendix 3). SMEs are mentioned in five articles as potential actors responsible for reducing plastic waste, consumption or developing new materials and innovating new products. In the case of PBs and plastic straws, retailers and businesses are given the most responsibilities. The next actors that are understood as having the main responsibility in reducing plastic use and waste are civilians and consumers. Only two articles mention the roles that recycling companies could be playing. The democratic process requires for any policy to first be implemented by the government, therefore the responsibility of the other actor is secondary to the government's implementation. In conclusion, the problem analysis of these articles is that plastics usage and consumption must be reduced and the responsibility of which are mainly distributed between retailers and consumers.

5.1.3 EPA Report Analysis (Dataset 3)

Even though the EPA reports span many more years than previous datasets, it identifies fewer actors while providing a larger set of problems, and offers just as few effects of plastic on marine ecosystems. The other problems identified are environmental and health problems caused in the cracking, refining and production stages. Many of which are considered

remedied through setting industry standards, regulations and guidelines as a solution that solves the problem. Over the years, a number of them have been re-evaluated and tightened due to growing public concern. Monitoring and assessment procedures have been added to improve upon pre-existing policies. However, these solutions just mentioned are rendered useless if not properly enforced. Other solutions include ones previously seen such as recycling, bans, public awareness and fines. The EPA identifies recycling, incineration, bioplastics and bans as solutions although previous analysis shows that these are only soft measures that have inherent problems of their own, such as additional input of resources and byproduct pollution. Various other solutions are also suggested such as innovation, the Green Mark certification, industry responsibility, effluent, remidences, circular economy, and reutilisation or recycling of industrial waste, but the continued active presence of NGOs is evidence that these measures are not enough. The EPA overall is less critical in their tone, even with all the environmental and health concerns of the production of plastics, the problem analysis does not include the continued production of plastic as a driver of this problem.

5.1.4 Synthesis of Triangulation: Answering Sub-RQ1

None of the articles or reports point to the production of plastic as a driver of the continued plastic problem. Even the EPA which discusses many of the local environmental issues caused by the industry does not reflect on reduction of plastic production. Only soft measures such as adding extra clauses to industry standards, banning a handful of plastic articles in select businesses and encouraging changes in consumer habits are the overall solutions offered. Therefore, the general problem analysis of the plastic problem held by Taiwanese people and institutions are focused at the end-of-life stages of plastic i.e. disposal methods.

5.2 Sub-RQ 2: How has the ingrained neoliberal logic in Taiwan inhibited the move away from both the petrochemical and plastic production industry?

After developing the discourse analysis of the plastic issue in Taiwan, the hypothesis that the lack of focus on production as the drivers for the plastic problem is due to the neoliberal logic inherent in the Taiwanese government (not to mention the global structure) and therefore its economic policies. This is explored through key themes derived from the analysis of primary interviews discussed below.

Profitable Industry held in high regards by the Government

In all four interviews, there is either direct reference, or it can be inferred that much of the government agencies believe that the petrochemical industry is one of the greatest achievements of Taiwan. Its growth played a crucial role in the industrialisation and economic development of the country as well as bringing international recognition leading to elevated standards of living.

Plans to expand the petrochemical industry have been a focus of several NGOs in the past few years opposing the policies proposed by the MOEA, which take a pro-expansion stance. There is a focus on plastics production as it is more profitable than diesel or petroleum, and therefore would not make economic sense to reduce production. This directly impacts the effectiveness of the EPA. Structurally speaking, the EPA is the governing body and holds the legal authority for environmental protection, it is considered a 柔適机构 (róu shì jī gòu), more of a compliant agency with weaker authority compared to that of the Ministry of telecommunication, transportation or MOEA. Thus, lacks practical influence and power and rarely uses its authority to oppose financially benefiting projects. As such there is a conflict between individuals and the organisation, where capitalist logic trumps the civic duties of EPA officers. An example was given by CET, of a factory that was promised to shut down do pollution problems but managed to delay that process with the support of the government though terms had already been agreed on and passed. This suggests that the EPA proposes actions based on public concerns to appear sympathetic to public opinion yet lack the effectiveness in the face of economic pressures. Another evidence of this is the proposed cleaning up of the industry as opposed to the contraction of the industry. Outdated industrial parks are scheduled to close and are replaced with newer ones with better technology which create less pollution (X, Sun & R, Winkler, personal communication, March 7, 2020). It is estimated that in doing so, pollution is reduced by two-thirds compared to previous impacts. An additional reason is that old factories are more energy intensive and therefore less competitive. Closing their current operations to invest in newer ones is therefore the current favoured policy. New factories such as the 8th naphtha cracker plant 八輕 (Bā qīng), which failed environmental assessments was moved overseas to China (B. Yu, personal communication, March 9, 2020).

The government has also proposed a cap-and-trade system for companies in the industry (R.Z. Zhang, personal communication, March 7, 2020). However, in order to implement the system, it first needed to collect data on how much the industry was emitting. This means that such

data did not previously exist and therefore could not be referred to when designing previous regulations. After several years, the system is being re-evaluated with the statistics to determine how the permits for companies to “responsibly” pollute should be designed. This system would also make it more difficult for new companies to enter the industry if existing companies hold all the permits. The effectiveness of cap-and-trade should be critically assessed if it is to reduce absolute levels of pollution. It is possible to have a system with very loose permits application systems for example. Giving the sense that the industry is being regulated, when in fact it could be operating business as usual. Moreover, these are technical solutions that do not require structural changes and have the potential to do more harm as it frames industrial activities as acceptable in this system or permission to pollute.

Rift between Employment and Social and Environmental Health

The overall strength of the petrochemical industry has led to some large socio-economic problems. Much of the workers in the industry are also local residents of the factories. The industry has provided them with employment, maybe even for several generations in a given family. The reliance of the industry for employment makes it difficult for those same people affected by the pollution to speak-out against big corporations. Legacies of the state-business relations from the time of the KMT are still prevalent in rural industrial areas. Donations from petrochemical giants to local elites ensures support from local politicians (Ho, 2010). As well as the hiring of inspectors are some commonplace ways in which the industry gains local support even at the cost of their local environment and health. The reliance that the local populace has on the industry for employment is a factor that plays into many of the discussions regarding the phasing-out or termination of a factory (X, Sun & R, Winkler, personal communication, March 7, 2020; H. Li, personal communication, March 6, 2020). In this way, the need to make an income is prioritised over environmental protection. Additionally, many of the banks in Taiwan exist thanks to the loans from petrochemical giants (R.Z. Zhang, personal communication, March 7, 2020), indirectly tying even more of society to the industry. This cleavages many, especially those that are more environmentally conscious as they cannot deny that much of current standard of living was made possible by such industries existing and polluting (R.Z. Zhang, personal communication, March 7, 2020). It is unclear how this will affect the perception of younger generations whose social returns from the industry, are not as high as previous generations but are left with much of the negative environmental legacies.

No Consensus for the Problem

Firstly, the opposing reputations of the industry make it difficult to come to a consensus about the petrochemical industry. On one hand, it is a polluting industry, but on the other hand Taiwanese society believes in neoliberal ideologies of how companies should make a profit, and this is how the government was structured in the past couple of decades (R.Z. Zhang, personal communication, March 7, 2020). The lack of consensus therefore stems from the fact that in order to have a good standard of living, the living environment can't be polluted, but to make money to have a higher quality of life, society is required to support these companies. This is how it was possible for the environmental movement to be framed as anti-Taiwan because they did not support the government, when in actuality, it was the economic policy that the movements opposed and not the nation itself.

Secondly, there is no consensus on the plastic problem, what the drivers are and how it can be solved. The NGOs interviewed both focus on the production of plastics however, both make this links to various other problems such as carcinogens, toxic chemical, the petrochemical industry, single-use plastic as well as networking with other organisations such as the Global Alliance for Incinerator Alternative and International Pollutant Elimination Network, neither NGOs have been able to make clear linkages that combine claims made by one organisation to claims made by the other. The CET Kaohsiung branch deals with pollution reductions, and says that due to all the chemicals involved with plastics, the problem is complex. All the different narratives of different NGOs makes the entire problem difficult to navigate. The majority of NGO work is localised to specific areas of environmental pollution potentially communicating to the general public that if they are not directly affected by this operation, it should not be a concern. However, neither made the claim that plastic production needs to be phased out. Without which, there is no logic to move away from this industry. Additionally, the mindset that all plastics is evil can sometimes lead people to making less environmentally friendly choices that may not be recycled, even though they believe that they are making better decisions (R.Z. Zhang, personal communication, March 7, 2020).

Wild points out that by only phasing-out single-use rather than all plastics is likely just a band aid for larger structural processes that dictate the sustained development of this industry. Without a consensus of the problem and therefore the movement, it is difficult to achieve consensus in mobilisation (Benford & Snow, 2000).

The consumer responsibility narrative is neoliberal in paradigm. In this paradigm, consumer demand is the market mechanism that is supposed to inform production in one of two

processes by creating a demand or reducing consumption as ways to signal production to scale up or reallocate its resources. Nonetheless, the Green Party wants big industries to be held accountable, and will still support any policy which cracks down on the overuse of plastics.

Economic Logic does not inherently include Environmental Concerns

The presence of environmental movements is evidence that the economic logic does not inherently consider the environment. NGOs continued demanding stricter environmental regulations. The regulations currently being presented by Wild influenced by Diane Wilson (an Environmental Activists) against the Formosa Plastics plant in Point Comfort, Texas, led to legal studies being conducted on Taiwanese policies. The results found that much of the regulations that were being falsified in the Texas plant did not even exist in Taiwan. There currently is no legal obligations for these industries to track or disclose leakages of plastic pellets into the ecosystem. This means that these regulations must be passed through governing bodies before they can even be enforced. These NGOs work tirelessly to incorporate environmental protection into the institutions that govern society, they do not exist automatically, and can still run the potential of being rejected from implementation. International legal frameworks could put Taiwan more in line with global standards. However, that could potentially mean reducing their competitiveness on the global market. CET has proposed a three zero standard (zero pollution, waste and accidents) for the industry to adopt as part of the movement to reduce pollution. Additionally, promoting value added products (products made of recycled material), where waste from one industry is the input for another. This enables a circular economy model to act as a market mechanism to change the industry practices. Currently, it is unclear how the government defines a circular economy and how industries will practice it. The petrochemical giants have the resources and responsibility to remodel themselves to continue to be industry leaders and to be sustainable in their own business model. After several decades of development Taiwan is now in a better position to reduce their dependence on this particular industry, by cancelling the subsidies, tax reductions and incentives this industry receives (R.Z. Zhang, personal communication, March 7, 2020).

Manufacturing-recycling Relations

Another way in which the neoliberal economic logic is present in institutional structures of Taiwan and not environmental interests is the manufacturing-recycling relations that have been formed by certain policies. The recycling fee system operated by SMEs paying a tax by

weight on the plastic articles they produce to a special fund managed by the EPA (X, Sun & R, Winkler, personal communication, March 7, 2020). This money is distributed to recycling enterprises acting as a subsidy for their operations. In this way the EPA holds SMEs financially responsible for plastic manufacturing, while petrochemical giants go unscathed. This tax system creates a lock-in for recycling, as recycling enterprises' profit is directly tied to plastic manufacturing because of this policy. This then creates an incentive for SMEs to manufacture more items that weigh less, single-use plastic articles for example. These kinds of policies have had the opposite effect and therefore better policies designs must be implemented.

In recent years, value added products have become increasingly promoted and integrated into business models by collecting, cleaning then recycling materials to recycling companies. Different techniques are used to process the plastic into various new materials such as textiles to make all sorts of articles of clothing and even faux wood. In the past, the EPA had a return system for plastic bottles to incentivise collection but that eventually reversed. Then some companies operated on slightly different business models of investing in importing plastic bottles or the cleaning of them to sell off to companies that would process into value added products (B. Yu, personal communication, March 9, 2020).

Tale of Three Counties

Yunlin County 雲林縣, Changhua County 彰化縣, Chiayi County 嘉義縣 are rural areas with not many job opportunities and many illegal factories have been built on farmlands. The farmland status refers to the types of structures and uses allowed on the property, and are not regulated as they should be because they're not built on designated industrial land. The economy of these three counties are heavily based on these illegal factories (R.Z. Zhang, personal communication, March 7, 2020). These operations emit pollution that renders the land contaminated therefore unfarmable. The government has been trying to tackle this problem for years, however the reliance of the factories for income makes this very difficult. A series of negotiations led to a ten-year period for the majority of these factories to retire, however the eventual law that was passed was a twenty-year grace period before terminating operations (R.Z. Zhang, personal communication, March 7, 2020). These three entire counties point to the inherent economic logic that dictate the lack of environmental governance present.

5.3 Sub-RQ 3: How can environmental movements mature their framing of the plastic problem in a way that targets the real drives of the problem?

What is the problem?

On a practical level the work of Wild and CET to link the various environmental problems with the activities of the petrochemical industry are an invaluable first steps to create diagnostic frames that can later be used in favour of the movement. The current issue with these narratives is that they are too many and complicated for the general public to understand. Therefore, their problem analysis is difficult to navigate and include many different aspects which should be narrowed towards production as the main driver of the plastic problem. Thus, making the same mistake of a limited organisation frame, which is too exclusive to a locale and group directly affected, causing a rift in widespread support (Benford & Snow, 2000). Additional to this, much of the framing has seemed to be NGOs versus the industry. However, since many people rely on this work they must be sensitive to that and frames should offer narratives that include alternative sources of employment. This is especially true for gaining the support of younger generations that have been seeing decreased wages and lack of opportunities (R.Z. Zhang, personal communication, March 7, 2020).

Conversely, the problem should be framed as narrowly as it has been in the media. The PB and straw problem analyses should have been symbols of the problem. Reflecting the disproportionate use of them to actually improve our quality of life, rather than taking on the responsibility for the entire plastic problem. Similar issues arise from the microbead ban, focusing solely on the specific material as opposed to questioning whether or not microbeads are needed in the first place.

Moreover, philosophical questions about the inherent neoliberal structures in government need to be posed. On a fundamental level, these logics are taken for granted, and as it was made evident environmental concerns are not built into the economic logic. Should economic proxies still be used as the main indicator for human progress? Should Taiwan be looking at different measures that synergies can be formed with other social elements? In the past these industries allowed for rapid development and elevated standards of living, but these are different times. Additionally, the ideology that creating things that do not deteriorate in a reasonable amount of time to be reabsorbed is irresponsible. These two fundamental questions are gravely missing in the framing of the plastic problem.

How to change it?

The inability of NGOs to frame who should be responsible for the problem has pinned them in direct opposition to big petrochemical operations. Instead, movements should be maturing their narrative by using the knowledge they have of other social ailments in their prognostic frames. Since the EPA hardly used its authority independent of economic interests they cannot be expected to act instinctively, but their concern for public opinion can be exploited. These narratives must be made explicit by claim agents (Benford & Snow, 2000), CET spoke about the potential for activist operators for public opinion. Unlike the EPA, movements have freedoms that institutions lack, therefore claims cannot come from such institutions (Tarrow, 2011), but the recent absorption of NGOs into formal processes could begin to affect their disruptive power.

Some of the interviewees mentioned the pride that comes with international recognition which helps to affirm Taiwanese identity. This fact could also be exploited to create resonance with the Taiwanese. Therefore, movements should use network and resources to gain international traction even if these are not the large intergovernmental organisations that Taiwan would like to be part of. These sorts of links must be made to the specific cultural and local identities and values in order to see what existing mechanism can or should be used to build the foundations for why the public should care.

Why should you care?

The final frame needed to satisfy whether the local populace can stand behind a movements' claims comes with including them in the framing of the problem. For Taiwan, this means being sensitive to those that currently rely on the industry. The object of the claim could include the government's role to better invest in industries and employment opportunities which are at the cost of the health of the local populace and environment, this is especially true for the younger generations that are finding it increasingly difficult to make a decent living (R.Z. Zhang, personal communication, March 7, 2020).

NGOs have not been able to successfully incorporate the interests of others not directly affected, but this leaves out many would be participants. Therefore, these types of resonances must be made clear by claimsmakers in order for the public to have a straightforward and simple understanding they can agree with.

6 Discussion

The main findings of the research are that the problem analysis of plastics is mainly understood as a need to reduce consumption. Six main themes were identified as evidence of the ingrained neoliberal economic logic that results in the inability to consider production of plastics, and the strength of the petrochemical industry as a driver of the plastic problem. Furthermore, the current frames used by NGOs have been insufficient in mobilising a movement needed to create structural change. These findings are important starting points for environmental movements in Taiwan to consider when reformulating their claims and subsequently how those claims are framed and delivered to the public. The implications of which would mean a matter of successful or unsuccessful mobilisation of the movement. NGOs within the movement therefore need to mature their claims in accordance with social movement theory and the finding of this research to develop their narrative. Linkages could even be made with other non-environmental movements such as the labour and gender movements (Ho et al., 2018). Moreover, actualising the inherent neoliberal values of state institutions could offer ideological restructuring that would not only change that plastic industry but bring to table questions about the fundamental role governments should be playing in society. In exploring this, it is realised that the strengthening of private actors in the industry worked in conjunction with the reduced state capacity (Ho, 2005). This is not an argument in favour of the authoritarian structure that existed, but as a means to illustrate the unchecked power that the industry has enjoyed for too long. Regardless of where the pressure for those reforms originate, in a democracy, the state must be the institution to ultimately reverse that process. The function of a green democracy or government for example (Wong, 2015) would be interesting future research that has the potential to resolve some of the findings explored in Sub-RQ 2.

Another legacy of the KMT rule that complicates the transitions away from this industry stems from the high levels of co-optation of social-ties and corruption (Ho, 2010). This has set back the government's ability to effectively penalise or enforce the law. This obviously jeopardises legal milestones, therefore, movements should take extra care of this when making a claim.

Institutionalisation is another common process which takes place in the evolution of movements. The excitement of the disruptive phase cannot be sustained or run the risk of becoming violent (Tarrow, 2011) so movements will institutionalise their tactics in an attempt to gain legitimacy through negotiations and compromise. This trade is made at the cost of its disruptive power and often transforms a movement into political parties or interest groups. Existing literature on the institutionalisation of environmental movements in Taiwan also

offers a critical look into both the strengths and weaknesses of this process towards movements as seen with the founding of the Green Party and development of official NGOs. This however has caused rifts between the Party and NGOs (R.Z. Zhang, personal communication, March 7, 2020). Future research must explore ways to unify the two groups to maintain a unified front. Institutionalisation should not be confused with the NGO-isation of resistance, which refers to the deliberate fabrication of NGOs to take the place of public services as the state abdicated its traditional roles to them (A. Roy, 2004).

Limited in this research is the actual exploration of the anti-plastic movement in Taiwan. As well as the analytical distinction between movements and NGOs. Though, exploring the campaign, repertoires and WUNC of the movement could offer even more guidance for its future, it was not necessary as the research here set out to identify the problems in framing preventing production to be understood as the driver.

It must also be acknowledged that even if environmental movements are able to stop the production of plastic in Taiwan, there is a potential that the gap in production maybe be reabsorbed by another market. However, this does not diminish the significance of stopping plastic production in Taiwan. International solidarity frames could be then explored as a mechanism to stop transfer of production to another country. The emulation of Taiwanese environmental movement's successes, if achieved, should be used as a resource for the global anti-plastic production campaign.

7 Conclusion

The petrochemical industry has long since received special treatment from the government, which has in large part prevented Taiwan's ability to reduce the industry's detrimental environmental impacts. Now, it enjoys the benefits of past policies without a strong state above them (Arrigo & Puleston, 2006). As the environment degrades and public concerns build, solutions must be put forwards to deal with the issues. The current problem analysis is based mainly on consumption, found during the problem analysis in Chapter 5.1. It is clear that consumption of PB and straws have been the topic of choice for both the media and the EPA. What is not incorporated in the narrative is how even if Taiwan reduces its plastic consumption, the Taiwanese petrochemical industry has large export businesses. Therefore Taiwan is responsible for the globalisation of this plastic problem. Moreover, the legacy of corruption from the KMT rule means that the laws passed and industry standards set within the nation do not get enforced at the local level. The co-optation of petrochemical giants adds to problems regarding public support and mobilisation of the people because these industries provide jobs and income.

The role of social movements is to frame the problem differently. First making that claim that the focus of the problem should be on the production of plastic. The way in which social movements shift the framing of this problem from a problem of consumption to a problem of production is simply by making those links explicit. Secondly, linking the production to the petrochemical industry. When doing so they must take into consideration the various types of personal interests in order to develop a narrative of frame which can be easily supported by various social groups. This may be an organisational frame that is broad and also inclusive of different social groups, or it may require several frames all supporting each other.

On a philosophical level, these beliefs in neoliberal tendencies must be questioned. Social movements are the mechanism to manifest the power for change, as a green government does not currently exist and since the industry is unwilling to change due to financial interests. Movements should also question the role of governments in society. The claim that social movements should make is the claim for ideological reforms in the government. As it currently is, the government supports industries which generate a profit for the nations. Therefore, the government does not have an ideological structure that has the health of society and the environment built in. Claims that consumption is the problem must be rejected for it is based on neoliberal logic that consumers should be responsible as their consumption habits inform the market, which in turn informs industries how to reallocate

resources. Instead governments need to enforce harsher fines or incentivise industry leaders to innovate new products or procedures that have less of a strain on the environment. In order for the movement to make such fundamental claims, social movements first need to be able to frame the plastic problem in ways which will resonate with the public and prove salient for mobilisation.

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Appendices

Appendix 1: Plastic type category breakdown

Plastic Materials	Polyvinyl chloride (PVC)
	MLDPE
	Polystyrene (PS)
	Polypropylene
	Acrylonitrile butadiene styrene (ABS) resin
	Polyester chip
	Nylon chip
	Other PVC chips (excl. polyester/nylon chips)
	Engineering plastic
	Unsaturated polyester resin
	Phenolic formaldehyde resin
	Epoxy resin
	Other synthetic resin
Blended Textiles	Rayon spun/blended yarn
	Polyester spun/blended yarn
	Other man-made fiber spun yarn
	Polyester textured yarn (no spandex)
	Polyester filament-spandex composite yarn
	Nylon textured yarn (no spandex)
	Nylon filament-spandex composite yarn
	Poyester textured yarn fabrics
	Nylon textured yarn fabrics
	Other man-made spun fabrics
	Man-made spun fabrics
Man-made fibres	Nylon filament
	Polyester filament
	Polyester staple
	Other man-made fibres
Plastic Sheets, Pipes and Tubes	Polyvinyl chloride leather (PVC leather)
	Polyurethane synthetic leather (PU leather)
	Other plastic leather
	Polyvinyl chloride film (PVC film)
	Other plastic sheet
	PVC pipe
	Other plastic pipe (excl. PVC pipe)
	Plastic floor tiles
	Acrylic sheet
	Plastic board
Plastics Films and Bags	Plastic bag
	Plastic film
Plastic Cabinets and Parts Production	Plastic cabinet
	Industrial plastic fittings
Other Plastic Products	Plastic leather products
	Reinforced plastic products
	Plastic adhesive tape
	Plastic container
	Plastic tableware & kitchenware
	Plastic gloves
	Other plastic products

Appendix 2: Table of result for dataset 1

2016	2017	2018	2019
<ul style="list-style-type: none"> - Plastic bags used (NL16) - EcoWatch (NL16) - 782 bags/person/annual (NL16) - Taiwan Environmental Information Association (NL16) - 18 billion plastic bags annually (NL16) - 2002 Plastic bag levy (NL16) - Recycling plastic bags (NL16) - Reduced consumption (NL16) - Major environmental issue (NL16) - Persistent problem (NL16) - Plastic bags in distribution (NL16) - Voluntary agreement (NL16) - New Southbound Policy (FT16) - Taiwanese Plastic Companies (FT16) - High added value plastic products (FT16) - Competitiveness/competitive advantage/ competitive 	<ul style="list-style-type: none"> - Ticking time-bomb (NL17) - Plastic waste (NL17) - Giant garbage island (NL17) - Marine life (NL17) - Plastic problem (NL17) - The more we use, the bigger the problem (NL17) - Discourage/reduce use of single-use plastic bags (NL17, TN17, FT17) - Plastic bag levy (NL17, TN17, FT17) - One of the first countries (2002) (NL17) - Banning retailers (NL17) - Policy expanded (NL17, TN17, FT17) - Small businesses not included (traditional markets, night markets, breakfast joints) (NL17) 	<ul style="list-style-type: none"> - Impact of plastic bag ban (NL18) - Plastic bag ban policy (NL18) - Plastic bag levy (NL18) - EPA (NL18, TN18) - Beverage vendors (NL18) - Ban having marked effect on reducing use of plastic bags (NL18) - Violators' fine (NL18) - New regulation to curb plastic use (TN18) - Single-use plastic straw ban (TN18) - Paper/ biodegradable/ sugarcane straw alternative (TN18, FT18) - Not actively provide unless requested or for special drinks (TN18) 	<ul style="list-style-type: none"> - Policy to reduce single-use plastic bags (2002) (NL19) - Plastic bag ban expansion (2018) (NL19) - EPA (NL19, TN19) - Single-use plastic cup, straw and bag ban (2020) (NL19) - Traditional market (NL19) - Plastic waste (NL19, FT19) - Bring your own/ reusable containers (NL19) - 18 billion plastic bags (NL19) - Positive incentives (NL19) - Homemakers United Foundation reward program (NL19) - Plastic free momentum (NL19) - Waste reduction (NL19) - Spread awareness (NL19)

<ul style="list-style-type: none"> - edge (FT16) - Taiwan Plastic Industry Association (FT16) - Export Market (FT16) - New opportunities/ Potential business opportunities (FT16) - Increasing wages in China (FT16) - Lower labour costs and emerging markets (FT16) - Rich in natural resources (FT16) - Original equipment-manufacturer model (FT16) - Enhancing trade and economic ties (FT16) - Diversify taiwan's trade relations (FT16) - Avoid over-reliance on china (FT16) 	<ul style="list-style-type: none"> - EPA (NL17, TN17, FT17) - Greenpeace Anti-plastics campaign (NL17) - Incinerator (NL17) - Phase-out single-use plastic (NL17) - Downgrading and recycling (NL17) - biodegradable/ lack compost fields (NL17) - Government pressure on industry for non-toxic alternatives (NL17) - Bring your own (NL17) - Dual-purpose bags (TN17, FT17) - United Nation (TN17, FT17) - 18 billion /782 bags/person/annually (TN17, FT17) - Fines for failure to abide (TN17, FT17) 	<ul style="list-style-type: none"> - Wooden cutlery alternative (TN18) - Comprehensive waste management system/world leading recycling operations (TN18) - Plastic straws not recycled (TN18) - Public outcry/ pressure (TN18) - Alternatives not much better (TN18) - Public change in habits of use and dispose (TN18) - Energy input in incinerators and recycling plants (TN18) - Reusing better than recycling (TN18) - Sustainable business practices (TN18) - Ju-Tian Eco-Material Co., (FT18) - Circular economy (FT18) - Low carbon emission and low 	<ul style="list-style-type: none"> - Plastic pollution (NL19) - Encourage change in habits (NL19) - Single-use plastic straw ban (TN19) - KFC No straw campaign only with request, will reduce its plastic usage by 52% (TN19) - McDonalds with similar campaign (TN19) - Marine waste crisis (TN19) - Underperformance of plastic bag ban (FT19) - Greenpeace (FT19) - No systematic plan for cutting use of plastic packaging (FT19) - Need for companies to draft phase-out plans and communicate it properly to employees and customers (FT19) - Company plastic policy (FT19)
		<ul style="list-style-type: none"> - energy consumption (FT18) - Polylactic acid (PLA) (FT18) 	<ul style="list-style-type: none"> - United Nations (FT19) - Recycling (14%), improperly discarded (32%), landfilled (40%), incinerated (14%) (FT19) - Entering food chain (FT19)
Categories Missing			
End-of-life Measures Miscellaneous Alternatives Materials Incentive for reduction	Business/ economy policies Alternatives Materials	Miscellaneous Environmental Impacts	Alternatives Materials
Plastic Bags ;Environmental Impacts;Business/ economic policy;Organisations /Agencies;Soft measures: Encouragement / Usage ;End-of -Life Measures;Incentives for reductions;Alternatives Materials;Miscellaneous			

Appendix 3: Table of articles used in dataset 2

Article No.	Title	News Outlet	Date	Link
1	Taiwan Is Reducing Single-Use Plastics Everywhere, Except Traditional Markets	 The News Lens 關鍵評論	2019/05/06	https://international.thenewsline.com/article/118335
2	Taipei Trash and Recycling: A Quick and Easy Guide	 The News Lens 關鍵評論	2019/04/17	https://international.thenewsline.com/article/117330
3	Taiwan retailers not doing well on reducing plastic use: Greenpeace	focustaiwan	10/22/2019	https://focustaiwan.tw/society/201910220014
4	Formosa Plastics to pay US\$50 million to settle Texas pollution case	Focustaiwan	10/16/2019	https://focustaiwan.tw/business/201910160011
5	Taipei City starts checks as plastic straw ban goes into effect	focustaiwan	07/01/2019	https://focustaiwan.tw/society/201907010012
6	Environmental agency censured for poor plastic waste management	focustaiwan	05/10/2019	https://focustaiwan.tw/society/201905100025
7	KFC Taiwan stops serving plastic straws	Taiwan news	2019/06/12	https://www.taiwannews.com.tw/en/news/3722306
8	Taiwan Turns with the Tide Against Plastics Pollution	Taiwan business	OCTOBER 17, 2019	https://topics.amcham.com.tw/2019/10/taiwan-turns-against-plastics-pollution/
9	Taiwan Chemical Industry Faces Uncertain Future	Taiwan business	SEPTEMBER 18, 2019	https://topics.amcham.com.tw/2019/09/taiwan-chemical-industry-faces-uncertain-future/
10	CPC Grapples with Challenging Business Environment	Taiwan business	SEPTEMBER 18, 2019	https://topics.amcham.com.tw/2019/09/cpc-grapples-with-challenging-business-environment/
11	CTCI Creates a New Model for EPC Turnkey Project Services	Taiwan business	SEPTEMBER 8, 2019	https://topics.amcham.com.tw/2019/09/ctci-epc-turnkey-project/
12	How Did Taiwan Become an Environmentally Conscious Society?	 The News Lens 關鍵評論	2019/09/03,	https://international.thenewsline.com/article/124153
13	Taiwan expands restrictions on single-use cutlery	Taiwan news	2019/08/08	https://www.taiwannews.com.tw/en/news/3760767
14	Taiwan to see plastic straws slashed by 100 million as new policy takes effect July 1	Taiwan news	2019/06/26	https://www.taiwannews.com.tw/en/news/3732496
15	Online shopping big contributor to plastic waste: EPA	Taipei times	Sep 17, 2019	http://www.taipetimes.com/News/front/archives/2019/09/17/2003722418
16	Less plastic use necessary to combat ocean pollution	Taipei times	Nov 23, 2019	http://www.taipetimes.com/News/taiwan/archives/2019/11/23/2003726341
17	Taiwan mulling acceleration of plan to ban plastic straws	Focus taiwan	04/29/2019	https://focustaiwan.tw/politics/201904290017
18	Taiwan introduces one of the world's most comprehensive plastic bans	inhabitat	03/12/2019	https://inhabitat.com/taiwan-introduces-one-of-the-worlds-most-comprehensive-plastic-bans/
19	EDITORIAL: Reduce all plastics, not just straws	Taipei times	Aug 16, 2019	http://www.taipetimes.com/News/editorials/archives/2019/08/16/2003720552
20	McDonald's Taiwan to end use of plastic straws by June	Taiwan news	2019/04/11	https://www.taiwannews.com.tw/en/news/3678266
21	Environmental agency censured for poor plastic waste management	Focus taiwan	05/10/2019	https://focustaiwan.tw/society/201905100025
22	Taiwan, the home of bubble tea, prepares for its plastic straw ban	quartz	June 27, 2019	https://qz.com/1652080/taiwan-home-of-bubble-tea-is-latest-to-ban-plastic-straws/

23	Taiwan a recycling example for Asia: experts	Taipei times	Jun 22, 2019	http://www.taipetimes.com/News/taiwan/archives/2019/06/22/2003717376
24	EPA might ban plastic straws in one fell swoop	Taipei times	May 01, 2019	http://www.taipetimes.com/News/taiwan/archives/2019/05/01/2003714355
25	A Plastics Giant That Pollutes Too Much for Taiwan Is Turning to America	Bloomberg quint	December 13 2019	https://www.bloomberqqint.com/businessweek/asian-company-that-pollutes-too-much-at-home-expands-in-america
26	Taiwan EPA sets timeline for ban on plastic straws	Taiwan news	2018/02/14	https://www.taiwannews.com.tw/en/news/3363954
27	Majority backs planned phasing out of plastic straws: EPA	Focus taiwan	03/11/2019	https://focustaiwan.tw/society/201903110013
28	Plastic straws to be banned for use at many venues from July	Focus taiwan	05/01/2019	https://focustaiwan.tw/society/201905010007
29	Taipei ban on disposable tableware at department stores starts Jan. 1	Taiwan news	2020/01/01	https://www.taiwannews.com.tw/en/news/3848419
30	Formosa Plastics fined NT\$450,000 after explosion at Kaohsiung plant	Focus taiwan	11/07/2019	https://focustaiwan.tw/society/201911070011

Appendix 4: Table of results for dataset 2

Art. No.	Terms/Themes (Coded using data set 1 codes)	Data set 2 Codes	Analysis
1	Expanding policy, reduce SUP/consumption, PB levy, retailer focus, traditional market, pollution, ocean plastic, changing habit, reusable bag, Homemakers United Foundation	R,C	<ul style="list-style-type: none"> - End of Life Focus - Specific ban - Ocean pollution concern - Responsibility placed on consumers - NGO
2	Recycling, waste guide, reduction, voluntary reduction plan, ban, reduce use, how-to-reduce guide, special lesson dai, collective sanitation responsibility, incineration, landfill, Green Collective	C, R	<ul style="list-style-type: none"> - End of life focus - Specific ban - Responsibility placed on consumers - Public responsibility
3	Retailers, eliminating plastic packaging, reduction, no comprehensive & systematic plan, communication between workers & customers, packaging data, eliminating SUP, waste, global crisis, recycling, improper discard, landfill, incinerator, ingested, Greenpeace	R, C	<ul style="list-style-type: none"> - Retailers responsibility - Specific ban - Responsibility placed on consumers - End of life focus - NGO
4	Formosa Plastic Corp., settlement, pollution case, waterways, lawsuit, pledge zero discharge, clean-up, pellets (nurdles)	N/a	<ul style="list-style-type: none"> - Petrochemical Company - Environmental violation lawsuit - Causing direct pollution from the plant - Potentially a lack of health and safety regulation or safety check bribery at the plant
5	Dept. Environmental protection, inspections, ban plastic straws, reduce use, informing customers, first-time violators, fines, encourage, disposable paper straws, reusable silicone, bamboo, bring your own, how-to guide	R, C	<ul style="list-style-type: none"> - Specific ban - Responsibility placed on consumers - Encourage alternatives
6	Control Yuan, EPA, censured, reduce plastic waste, PB ban, recycling mechanism, collective measures, waterway garbage, restrictions relaxed, production and use rise, negligence, failure to manage, investigate wrongdoings by public agency	R,C, G, S	<ul style="list-style-type: none"> - End of life focus - Ocean pollution concern - Production Mentioned
7	EPA, ban SUP straws, KFC, special request only, reduce usage, McDonalds	C, R	<ul style="list-style-type: none"> - Specific ban - Responsibility placed on consumers - End of life focus
8	Petrochemical kingdom, fight against production & use, alternatives, microbead ban, food chain, marine life, bisphenol A, stop import and manufacturing, cosmetics, phase out, EPA, local/international environmental groups, CPC Corp., Formosa Plastic Group, no natural oil/gas reserves, national economy, direct action, naphtha cracker, removing polluting industries, Greenpeace, encouraging schools, plastic free, packaging SUP, straw ban, United Nations, global crisis, microplastics, prochlorococcus, Minima Technology, biodegradable plastic, PB levy, beach clean-up, Marine Debris Management Platform	P, G, R	<ul style="list-style-type: none"> - Petrochemical Industry - Specific ban - Should Taiwan be in the plastic industry? - Changing industries - Encouraging consumer behaviour - Ocean pollution concern
9	Chemical sector, highest growth rate, export, complete supply chain, Formosa Plastic Group, CPC Corp., feedstock, refineries, naphtha cracker, lack large scale, environmentally sensitive population, shift into niche, explore overseas, less environmental activism, reduced competitiveness, high-margin speciality product, raw materials, finished products, domestic market, major petrochemical export hub, strong public opposition, raised public concern, health hazard, environmental violation, fines, heavy metals, cancer, PM2.5, air pollution, propane gas leak, global value chain, high	N/a	<ul style="list-style-type: none"> - Taiwan's previous investments in the sector lead to a complete supply chain - Local regulations lead to TW losing comparative advantage so the government is promoting exploration Southward. - Which would reduce local pollution but still contributing to global emission and pollution - Due to the negative environmental and health risks there should be stricter production regulations. - therefore , a global effort is needed to reduce

	performance synthetic rubber additives, government		<ul style="list-style-type: none"> plastic productions and therefore use - This consideration to venture into high performance
10	CPC Corp., energy security, Formosa Plastic Group, petrochemical plastic & rubber supply chain, olefins, environmental impact assessment, air pollution control, encourage investment, high-value additive chemical, circular economy, IT industry	N/a	<ul style="list-style-type: none"> - TW is losing competitiveness of low-grade plastics and should move towards more high-value additive chemicals that is used in the IT sector - There are still negative environmental effects associated and therefore the IT sector there for production needs to be more ethically regulated. - This venture in the high-values additives for the IT sector is just switching to the other "dirty industry" of Taiwan (https://www.brookings.edu/opinions/environmental-issues-facing-taiwan/)
11	USA, shale gas, refinery-petrochemical integration, CTCI, investment, efficiency, international business opportunities, Gulf Coast growth ventures	N/a	<ul style="list-style-type: none"> - Recent fracking ventures in the US and weaker regulations has made it more attractive to invest overseas. - This also helps TW become less dependent on the Chinese economy
12	EPA, straw ban, waste reduction, public consciousness, merchants, PB levy, bring your own, alternatives, social and political suicide, shifting attitudes, zero-waste lifestyle, recycling guide, food safety, plasticiser, health concerns, moral obligation, personal habit, wet market, tv programme, spiritual environmentalism, western imposed ideology, rely heavily on consumer, plastic producing giants	R,C,G,S	<ul style="list-style-type: none"> - The concerns of plastic did not start with environmental concerns but concerns over the plasticizer in food container products which was having negative health effects. - But there hasn't been a connection made between toxins in plastic holding food and entering the food chain. - And if we don't want either of those things to continue we have to lessen our reliance on
			<ul style="list-style-type: none"> throwaway plastics. - And the amount of plastic being created needs to be reduced drastically
13	Restrictions, SUP cutlery, EPA, disposable tableware, fines, Waste Disposal Act, global trend plastic reduction, European Union, G20 Osaka Blue Ocean Vision, marine litter, policy tool, ban SUP straws	R,C,G	<ul style="list-style-type: none"> - Expanding SUP ban to eventually include all tableware. - Ocean plastic concerns - Enforcement will have costs for the EPA
14	Ban SUP straws, violators, warming, fines, EPA, alternatives, marine pollution, corporate responsibility, voluntary ban	R	<ul style="list-style-type: none"> - Specific bans - Ocean pollution concern - Considering corporations' role
15	Online shopping, increased plastic waste, EPA, Ministry of Economic Affairs, PB production, e-commerce, biodegradable, public support, manufactures and retailers adapted, recycled material, high-ranking recycling system, habit, reduce, influencing productions	R,C	<ul style="list-style-type: none"> - Growing e-commerce market is increasing plastic packaging use. - Alternatives are being suggested but this would still require a proper waste management scheme. - Potential for innovation in packaging material and also ways to pack. - Manufacturing and retailers are adapting to the growing public concerns but it's not enough as the problem analysis is not always complete and would be more beneficial for research to determine how best to innovate.
16	Ocean pollutants, Society of Wilderness, reduce use, International coastal Clean-Up, volunteer effort, government policies world-wide, external incentives, bring your own, plastic bottle lids, bring your own discount	C,R	<ul style="list-style-type: none"> - Ocean pollution concerns are pushed by organisations which run on volunteer effort - Consumer habits are still only changed slightly by external incentives such as PB levies rather than a holistic understanding of why we should reject SUP.

17	Ban Straw, waste recycling policy, ban SUP, polylactic acid (PLA), renewable resource, "eco-friendly", no system for recycling, contains plastic	RC,R, G	<ul style="list-style-type: none"> - Specific bans - Alternatives are being suggested but they still contain plastic so it's not really a shift. - It's clear that people aren't understanding the issues if this sort of change is being suggested and the EPA are actually considering this form of plastic to be okay. - End of life focus
18	EPA, new policy 2030, reduce waste, ocean pollution, food chain, human health, phase-out, retailers, war against plastic waste, PB levy, anti-plastic policy, national examples	R	<ul style="list-style-type: none"> - End of life focus - EPA has an aim to be completely zero-plastic by 2050 due to ocean pollution concerns. - Plastic industry is going to have a smaller market in the future - Window of opportunity for the plastic industry to start investing for their future in other ventures. - Set examples for other companies and countries that its possible to move away from plastic without losing out.
19	Straw ban, KMT, producing cup lids, bring your own, changing habit, discount, protect marine wildlife, stranded turtles, whale autopsy, ingestion, endangered, corporate interest	R,C	<ul style="list-style-type: none"> - Specific bans - KMT pushed for economic growth without concerning the environment for some years leading to growing oppositions of the KMT. - Ocean pollution concerns and plastics being ingested and killing marine wildlife.
20	McDonald's, straws, special request, paper straws, encouraged, reduce, marine ecology	R,C	<ul style="list-style-type: none"> - Showing some initiative by changing all in-store policies before the national ban came into effect. - Shows that it is possible to make changes and be a role model and that you don't have to wait for it to be a compliance issue.
			<ul style="list-style-type: none"> - Encourage consumer behaviour
21	EPA, reduce, recycling mechanism, garbage drift, restrictions relaxed, reduce waste, plastic granules, consumer habit, manufacture	C,S,RC, G	<ul style="list-style-type: none"> - EPA is not necessarily the best or strongest policing force as they were the ones that allowed for relaxing previous policies to encourage growth in the hotel and restaurant sector.
22	Bubble tea, SUP Straw ban, repeated violator fine, total phase-out 2030, EPA, habit, voluntary bans, new lids, alternative BYO, ocean pollution, landfills, waste, recycling policy, civic education, manufacture-pay system, zero-waste, product design	S, R, C, G	<ul style="list-style-type: none"> - Total phase-out of SUP straws planning for 2030, which mainly targets the infamous bubble tea vendors. - Manufacturers pay the government some money for recycling. - There is space for innovation in product design for better use and efficiency. - Ocean pollution concerns
23	Garbage Island, landfills, recycling, untreated waste, marine pollution, policy, global priority, reduce consumption, redesign products, "pay-as-you-throw", encourage less waste, grassroot effort	R, C, G	<ul style="list-style-type: none"> - Ocean pollution concerns - TW already has a relatively long history of trying to reduce consumption with special trash bags. - Much of the work is off the backs of grassroot effort. - The policies so far still unproportionately focus on incentivising and educating consumers.
24	Ban straw, EPA, polylactic acid (PLA) renewable resource, contains plastic	R	<ul style="list-style-type: none"> - Specific ban - Alternative but still contains plastic so its difficult to understand why it would be presented as a possible alternative.
25	FPG, USA, petrochemical production/ oil refinery, invest, global economy, pollution exchange for	N/a	<ul style="list-style-type: none"> - Fracking in the USA has made plastic more profitable in the US.

	economic growth, fracking, natural gas, reduce Co2, 1/3 of the cost, requirements/ regulations, Formosa "bad actor in Texas"		<ul style="list-style-type: none"> - But Taiwanese companies are seen as bad because of the pollution it is bringing. Taiwan is exporting its pollution while keeping most of the profit.
26	Ban SUP straws, EPA, PB ban, marine waste crisis, Sea Waste Management Platform, 3-stage phase-out, levy, everyone's responsibility	R, C, G	<ul style="list-style-type: none"> - Ocean pollution concern. - Specific ban - Article speaks about how it's everyone's responsibility but fails to point to the creators for any blame.
27	Straw phase-out, EPA, public support, clampdown on disposable items, complete ban 2030	R, C	<ul style="list-style-type: none"> - Specific ban leading to incorporate all sectors using straws by 2030. But that's another 10 years of just tinkering around the edges.
28	SUP straws, EPA, biodegradable plastic straw ban, fines, warnings	R	<ul style="list-style-type: none"> - Specific plastic product ban - Plastic alternatives - Enforcement process will not be as strict as the beginning of the policy implementation
29	Ban disposable tableware, violation fines, night market, United Nations, Osaka Blue Ocean Vision, reduce marine litter, zero by 2050	R, G	<ul style="list-style-type: none"> - Specific plastic product ban - Enforcement - Concerns about marine plastic pollution - Phase-out of single-use plastic
30	FPCorp., fine, chemical leak and explosion, toxic chemicals, Pollution Control Act, Explosion, Tasco Chemical Corp.	N/a	<ul style="list-style-type: none"> - Formosa Plastic Plant scandal exposing toxic chemical leaks - Leading to explosion on the plant - Potentially a lack of health and safety regulation or safety check bribery at the plant

Appendix 5: Table of results for dataset 3

actors	problems	solutions
petrochemical company	industrial waste	recycling
EPA	hazardous waste	incineration
MOEA	contamination	ban
environmental law enforcement agencies	soil & groundwater	innovation /R&D
	air quality	bioplastic
	emission	Green Mark products certification
	acid rain	green procurement
	wastewater	awards
	subsidies	public awareness/support
	plastic bag	industry responsibility
	packaging	finances/violations
	marine	monitoring/enforcement
	plasticiser	assessment/inspections
	health protection	standards/regulations/guidelines
	single-use	international cooperation/recognition
	leaks	recycling fee
	microplastics	restriction of use
	oil pollution	buffer zones
		effluent
		circular economy
		reutilisation/recyclable industrial waste
		remidences
		environmental bags
		disaster drills/response
		plastic restriction policies
		waste management/sorting

