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Household Recycling Behaviour in Metropolitan Australia: A Social Practice Theory Perspective

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HOUSEHOLD RECYCLING BEHAVIOUR IN METROPOLITAN AUSTRALIA: A SOCIAL PRACTICE THEORY PERSPECTIVE

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Declaration of Authorship

To the best of the candidate's knowledge, this thesis contains no material previously published by another person, except where due acknowledgement has been made.

This thesis is the candidate's own work and contains no material which has been accepted for the award of any other degree or diploma in any institution.

Human Ethics: The research presented and reported in this thesis was conducted in accordance with the National Health and Medical Research Council National Statement on Ethical Conduct in Human Research (2007, updated 2018). The proposed research study received human research ethics approval from the University of Notre Dame Australia Human Research Ethics Committee (EC00418), Approval Number #2020-155S.

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Abstract

Australians generate almost 545kg of annual kerbside waste per capita, one of the highest amounts compared to other OECD countries (Blue Environment, 2022). Although kerbside systems in Australian metropolitan areas are well-developed and the recycling practice is considered a social norm, residents' inaccurate handling of recyclable items send as much as 35% of valuable recyclable materials to landfill, contributing to environmental harm (Cleanaway Waste Management Limited, 2021). Furthermore, newly established recycling schemes in Australian jurisdictions are not used to their full potential.

In the context of both issues, the current thesis aims to understand the underperforming nature of recycling practices and provide recommendations on approaches to recover more recyclable materials. More specifically, this thesis analyses household recycling behaviours through the lens of Social Practice Theory (SPT). The results reveal that inefficient household kerbside recycling practices are rooted in specific inefficient material elements (such as different industry technologies, complex packaging, and a general underdeveloped industry landscape for resource recovery) built around the practice, leading to a lack of sorting and separation skills. In the context of newly implemented recycling schemes, such schemes are often overruled by the convenient kerbside system, leading to the continuous inaccurate handling of recyclable items.

This thesis contributes to translating practice-based insights associated with inefficient household recycling into practice-based recommendations for environmental practitioners. Within a broader agenda, this thesis contributes to a growing body of literature highlighting the limitations of traditional environmental education campaigns while proposing a practice-based approach to reframe responses to escalating environmental issues.

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Susann Noé

Table of Contents

List of Figures

List of Tables

List of Abbreviations

ARL: Australasian Recycling Label

CDS: Container Deposit Scheme

CE: Circular Economy

MRF: Material Recovery Facility

MSW: Municipal Solid Waste

NWP: National Waste Policy

NWPAP: National Waste Policy Action Plan

PEBC: Pro-Environmental Behaviour Change

SPT: Social Practice Theory (Shove et al., 2012), Practice Theories (Halkier & Jensen, 2011), Theories of Social Practices (Reckwitz, 2002), or Social Theories of Practice (Watson & Shove, 2008) are plural expression for one and the same theory (Reckwitz, 2002). In this thesis the term Social Practice Theory (SPT) will be applied.

WARR: Waste and Resource Recovery Industry

Chapter 1: Introduction

1.1 Chapter Overview

Growing up in Germany, waste separation and recycling were part of my daily life. The German kerbside system only provides a small bin for ‘general waste’, making everyone sort recyclables (such as glass) separately, providing bins even for its respective colours. I suppose calling recyclables ‘Wertstoffe’ in the German language — which means valuable materials — reflects how we feel about recycling in German society. When Germany introduced a Container Deposit Scheme (CDS) in 2001 that credited 25 cents for each beverage container, no one in my personal environment questioned participation in the scheme. Our ingrained recycling culture would not allow it. Before I moved permanently to Australia in 2016, my former employer — one of the largest waste and recycling companies founded in Germany over 100 years ago — gave me intensive training to understand the German CDS. I took this understanding overseas, where Australian states were waking up from a ‘landfill slumber’ and willing to take more sustainable action guided by the global circular economy and sustainability movements.

Arriving in Australia, which in my opinion is one of the most beautiful countries in the world, I soon came to realise that my personal experience in the context of recycling had nothing to do with the realities here. The amount of waste produced in Australia tripled between 1996 and 2018 (from 22.7 Mt to 61.5 Mt) and national recycling rates are well below the global average (Blue Environment, 2018, 2022). During my time in the Australian waste and recycling industry, I learnt that the country is not self-sufficient and although the wish for a better system is omnipresent, change is slow. Living here, I've noticed that Australian mindsets are slowly changing; however, factors such as inconvenience and a lack of knowledge or time often overrule good recycling practices. Personally, such issues have often made me feel disillusioned with the standards of the recycling system here. This disconnection sparked the ambition to contribute to the betterment of current practices. Such ambition very quickly led me to the potential of applying academic research to analyse the problems around recycling and help foster recycling cultures.

Therefore, this thesis aims to better understand the reasons behind inefficient kerbside recycling practices and limited container deposit scheme (CDS) participation in Australia. Looking back, combining my personal interest in recycling with this PhD research project has been one of the most exciting and challenging journeys of my professional life. Still, I am submitting this thesis with a sense of joy and enthusiasm. My personal goal is to apply my research knowledge in the Australian industry and government sectors as well as to contribute to conversations around environmental psychology while helping the country move forward in this important area of society.

This chapter proceeds as follows. Section 1.2 defines key terms used in this thesis and Section 1.3 describes the research background, exploring the global move from a linear to a circular economy, with a focus on the Australian context. This is followed by a discussion of the research problem (Section 1.4), aims (Section 1.5), research questions (Section 1.6), and methodology (Section 1.7). Section 1.8 describes the significance of the research, and Section 1.9 provides an overview of the thesis structure.

1.2 Definition of Key Terms

This section provides definitions of key terms used in this research.

Behaviour comprises conscious actions or the “observable expression of [a] social phenomenon” (Spurling et al., 2013, p. 8) performed by a body-mind construct (Reckwitz, 2002b; Schatzki et al., 2001). Such actions, however, are just “the tip of the iceberg” (Spurling et al., 2013, p. 8) as they cannot provide the reasons for a behaviour that lie beneath the surface.

Container Deposit Schemes (CDSs) are a circular business model popular and best-known in high-income countries, including many European countries and the US (White, 2001b). The aim of CDSs is to increase recycling rates of materials such as plastic, aluminium, or glass (Snow, 2015). To do so, the schemes provide an incentive to changing people’s behaviours related to the end-of-life decisions of their used beverage containers.

Habits are single repetitive actions that require no intelligence and therefore seem closely related to practices (Maggio, 2017). However, the assumption they are the same is misleading and too simplified. Reckwitz (2002) clarifies the difference in that practices exist as a pattern including specific required elements such as physical and mental activity, know-how, emotional meaning, materiality etc., to keep the shape of the pattern intact. As such, a practice is more complex than a habit because its pattern incorporates various individual actions which can, but do not have to be, habitual. If a practice does include habitual patterns, it could be seen as a system of habits or habitual pattern and is often unchanging as their patterns are relatively stable (Shove, 2012).

Household recycling, in the context of this research, refers to household kerbside recycling through the use of the co-mingled yellow recycling bin (Kaufman et al., 2020) and recycling through participation in CDSs.

The *Municipal Solid Waste (MSW)*[1] *system* or kerbside system is a scheme provided to residents by their Local Government (LG) authority to collect waste and recyclables (Department of Agriculture Water and the Environment, 2020) comprising a minimum of a red (general waste) and yellow (recycling) bin (paper/cardboard, metal, glass, plastic) (Moloney & Doolan, 2017) in metropolitan areas (Blue Environment, 2018).

'To *practise*' refers to bodily activity that can be viewed as part of what we know as everyday habits or routines, or, as Schatzki (2001, p. 54) puts it, "people are always carrying out this or that practice". Investigating the pattern of practice can help explain specific required elements for performed actions (Reckwitz, 2002) that make them human conduct (Spurling et al., 2013).

[1] MSW also includes waste from public bins (Australian Government, 2009); however, household waste comprises the bulk of MSW worldwide (Hoornweg and Bhada-Tata, 2012).

Pro-environmental behaviour change, in this research, refers to developing better environmental practices such as recycling at the household level, for example by improving sorting practices or by making use of recycling schemes such as Container Deposit Schemes, “to minimize the negative impact of one's actions on the natural and built environment” (Kollmuss & Agyeman, 2002, p. 240).

Waste refers to items or substances that are unwanted and valueless to the holder and supposed to be discharged, rejected, or abandoned (OECD, 2001). In Australia this includes “materials or products that are recycled, converted to energy, or disposed” (Commonwealth of Australia, 2018b, p. 5). Throughout this thesis, items that can be recycled will be called recyclables instead of waste in order to harness the value they carry (Commonwealth of Australia, 2018a).

The *Waste and Resource Recovery Industry (WARR)* includes many forms of waste activities with the four main foci of waste collection and transfer, sorting, recycling, and landfilling to process waste from three main streams: Construction and Demolition (C&D), Commercial and Industrial (C&I), and Municipal Solid Waste (MSW) (Commonwealth of Australia, 2018b). The focus of this research lies on recycling.

The term *waste sorting and separation* in this thesis refers to the two core activities of recycling: the act of manually sorting and separating particular types of recyclables at the household domain. It refers to the term waste sorting as putting whole items into one appropriate bin. The term waste separation is applied to kerbside practices when pulling whole items apart and putting their material components into various appropriate bins.

1.3 Background: A Global Turn to Recycling

1.3.1 Linear Economy

Global production has increased rapidly since the industrial revolution, with business models building on the use of cheap resources in the wake of comparably expensive human labour (Ellen MacArthur Foundation, 2013). In the context of waste, the natural consequence of such business models has led to a linear ‘take-make-use-dispose’

economy. The profit-driven attitude behind this business model is well known as a linear economy and is prevalent in Western societies. A by-product of this linear economy is the enormous amount of waste, including valuable recyclable materials, sent to landfills (Sariatli, 2017). During the past two decades, an opposing consciousness espousing the need for effective intervention to engender more sustainable practices for the retention of value that lies in waste has emerged (Silva et al., 2016). Such opposing consciousness started with environmental impact research such as Rockström et al. (2009) estimating the boundaries of our planet in the context of the ongoing linear exploitation. In this context the WWF (2012, p. 38) notes in 2012 that the level of exploitation of resources reached a point where “it would take 1.5 years for the Earth to fully regenerate the renewable resources that people used in one year” to neutralise our ecological footprint and support our social, economic, and demographic existence. As a solution to the problem, the generic notion of a circular economy — a concept that can be dated back to the 1960s and has grown significantly with the input of a vast number of environmental-consciousness theorists, researchers, and economic experts — has entered the discussion. The concept is generally supported by pan-national organisations such as the UN (2015) and the World Economic Forum (2016) (Sariatli, 2017).

1.3.2 Circular Economy

The global emergence of a circular economy proposes that waste should be managed in a circle of creation, transport, storage, treatment, and recovery, to retain its value and avoid the risk of causing pollution (Kirchherr et al., 2017). Hence, the goal of the circular economy is to manage waste in a cyclical manner, retaining as much value as possible from resources, products, parts, and materials to create a system that allows for long life, optimal re-use, refurbishment, remanufacturing, and recycling (World Business Council for Sustainable Development, 2015). Within the circular economy context, a ranking system termed the Waste Hierarchy, which ranks waste and resource recovery (WARR) options in accordance with their environmental desirability, has been accepted in Europe since the 1990s as outlined in the EU Waste Framework Directive (European Commission, 2023). The hierarchy has been adopted by the Australian Federal Government, with waste avoidance (i.e., not producing waste in the first place) ranked as the highest goal and most efficient means to decrease

environmental harm (see Figure 1.1). Goals two and three include resource recovery options following an upstream approach that leads to more sustainable consumption and manufacturing (Silva et al., 2016). Goal two refers to the reuse of products by the consumer, while goal three suggests that secondary materials that cannot be reused should be recycled and re-manufactured into the same or different products. Where recycling is not feasible, or secondary materials cannot be reprocessed, the fourth goal of the waste hierarchy is conservation in the form of recovering energy from the material. Energy recovery is the least preferred of all recovery goals in the waste hierarchy as it only releases embodied energy from waste but does not preserve the material itself. If a material cannot be turned into anything of use and could harm the environment or human health, it is treated and then disposed to landfill (Commonwealth of Australia, 2018b).

Figure 1.1: Australian Waste Hierarchy. Source: Commonwealth of Australia (2018b); Department of Agriculture, Water, and the Environment (DAWE) (2020).

The CE particularly focuses on the second and third goal of the waste hierarchy — reuse and recycle — to keep materials in circulation. The focus of this research lies in the third goal of the waste hierarchy, namely recycling, which is valuable twice over as it reduces the need for virgin materials and reduces the amount of waste going to

landfill. Developing circular business models to increase recycling presents significant opportunities for both industries and governments. According to the World Economic Forum (2022), globally, the transition to a CE could offer up to US $4.5 trillion in economic benefits by 2030. The UN promotes CE principles by providing guidelines, business models, and directives to governments around the world. Such principles build on knowledge regarding how to alter substantive economic processes to create new economies and build long-term markets with economic resilience that bring new growth and improved environmental sustainability, supporting the United Nations Sustainability Goals (Dey et al., 2022). In the context of household waste, governments and industries have responded to this broad appeal to adopt circular principles, for example by legislating through prevention policies for packaging waste (Tencati et al., 2022) or introducing recycling schemes such as take-back systems for beverage containers (NSW Government, 2017) in order to connect businesses to consumers to achieve behavioural change to increase the recycling of resources. Further examples used to promote the recycling of MSW at local government level range from waste charging schemes (Goddard, 1995), voluntary reduction agreements (De Jaeger et al., 2011), community waste separation bins, including those for food waste (Borrello et al., 2020), and the emphasis on promotional campaigns in general. However, despite the high environmental desirability of recycling activities within the CE, in 2020, only 8.6% of the world's systems of consumption and production were deemed circular (World Economic Forum, 2022).

1.3.3 The Australian Context

In the Australian definition, recycling entails an easy disassembly, collection, and sorting infrastructure within the product cycle to retain as many high-quality secondary materials as possible from waste streams[2] (Queensland Government, 2019). Recycling includes "activities in which solid wastes are collected, sorted, processed (including through composting), and converted into raw materials to be used in the production of new products" (Blue Environment, 2018, p. viii). During the global shift

[2] However, recycling has its limitations as the process itself causes pollution due to transportation, machine operations, and energy consumption etc. (Gaines, 2012).

to a CE (Kirchherr et al., 2017) including the rise of household recycling activities in the last two decades, Australia implemented a kerbside collection system within metropolitan areas to capture recyclable materials at the household level (Department of the Environment and Energy (DEE), 2018). However, due to a lack of rural and regional collection and sorting capacity and national processing and conversion infrastructure, the nation is making limited progress, with national recycling rates growing from only 7% of all waste recycled in 1996 to 55% in 2020/21 (Blue Environment, 2022), which is still well below the global average. Further compounding factors include Australia's expanding population (up by 26.7% from 1996 to 2018/19) (Datacommons, 2022), increased household consumption expenditures (up 2.6% p.a. from 1992/93 to 2005/06) (Department of the Environment, Water, Heritage and the Arts (DEWHA), and overall economic growth, making waste the most rapidly rising environmental and economic metric. In Australia, the amount of waste has tripled between 1996 and 2018 (from 22.7 Mt to 61.5 Mt), imposing significant management challenges (Blue Environment, 2018). These challenges go hand-in-hand with the need to build a rural and regional collection and sorting capacity and national processing and conversion landscape to move from a linear to a circular economy and recover as many resources as possible (Commonwealth of Australia, 2018b). The next section discusses the problem of underperforming household recycling rates reducing the quality and quantity of recyclable material coming through the recycling system in further detail, leading to the purpose and aim of this research.

1.4 Research Problem

This research examines household recycling practices, specifically the problem of underperforming household kerbside recycling rates and container deposit scheme participation in Australian metropolitan areas. This is intended because of Australia's poor recycling position compared to other countries. As discussed above, Australia generates more waste and recycles less than the average Western economy (Parliament of Australia, 2021). In the context of waste generation, according to the National Waste Report (2022), a comparative analysis of five countries (Australia, Norway, Singapore, the United Kingdom, and the United States) based on readily comparable data, indicates that Australia has the second highest waste generation per capita after the United States (2.13 t and 2.34 t per capita, respectively). In

contrast, Singapore for example rated the lowest at 1.26 t per capita (Blue Environment, 2020). In contrast, in the context of kerbside recycling, Australia recycles less than the average Western economy, with recycling rates currently at a national average rate of only 55% (Blue Environment, 2022). Contributing to such underperforming national rates (by definition recycling includes the collection, sorting, and processing of waste in Australia) are underperforming household kerbside recycling practices generating a loss of valuable resources at the household level, mostly caused by:

1) kerbside recycling is inefficient due to residents placing contaminants into yellow bins. Such contaminants can contaminate large amounts of recyclable materials that will consequently be sent to landfill (Kaufman et al., 2020).
2) many recyclables are found in landfill, due to their disposal via the general waste bin together with waste that is not recyclable (Blue Environment, 2020).

A national study by Cleanaway Waste Management Limited (2021) demonstrates that due to both points of leakage up to 35% of kerbside recyclables coming from household bins are found in landfill, worth hundreds of millions of Australian dollars[3] (Moloney & Doolan, 2017; Department of Water and Environmental Regulation (DWER), 2019). Households, in particular, send an alarming amount of plastic to landfill, resulting in a national plastic to landfill rate of 85% (Blue Environment, 2020). Considering Australia is the world's leading single-use plastic waste generator, it is a shocking result that only 15% of plastics are recycled, only 4.2% are reprocessed locally, and that 11% of all single-use plastics are leaking into the environment (WWF Australia, 2021). The high loss of valuable resources at the household level indicates that there is still a lot of work that needs to be done to enhance kerbside practices to reach their full potential (Blue Environment, 2018; Moloney & Doolan, 2017). To increase the recovery of resources (such as single-use plastic bottles) coming from households, state governments have recently introduced container deposit schemes (CDSs) that provide a refund of 10 cents for the return of beverage containers. However, recently introduced schemes such as in NSW, QLD or WA are failing to

[3] The Centre for International Economics reports that increasing Australia's recovery rate by just 5% can add up to $1 billion to the nation's GDP (Australian Government, 2022).

reach their return targets. This indicates a lack of scheme participation amongst residents (Return and Earn, 2023). In addition to underperforming household kerbside recycling practices, this lack of scheme participation is the second research problem analysed in this thesis.

1.5 Research Purpose and Aims

The purpose of this research – primarily from the perspective of environmental practitioners[4] - is to better understand the underperformance of household kerbside recycling and CDS practices through a SPT lens. This will help to provide insights and recommendations to governments and industry to enhance practices imperative to the recycling of recoverable materials in Australia. This approach will support the overall aim of this thesis, to obtain a broader system-wide understanding of both practices and investigate them through the lens of Social Practice Theory (SPT). Both kerbside recycling and CDS are environmental practices interconnected to a network of everyday practices, which can often be difficult to change due to everyday practical challenges and social norms. To meet this overarching research aim, three aims are considered as follows:

Aim 1: Understand how household kerbside recycling practices are enacted in the Australian metropolitan household.

Aim 2: Understand how environmental practitioners approach the improvement of household kerbside recycling practices.

Aim 3: Investigate a large-scale policy intervention — a newly implemented Container Deposit Scheme (CDS) — that seeks to encourage residents to increase source separation at the household domain to improve recycling outcomes and in so doing promote a circular economy.

[4] The choice to focus on environmental practitioners and not residents was also underpinned by the global Covid-19 pandemic and the pragmatic aspect that a digital communication channel (e.g., via Zoom) is more suited to working professionals who have access via business accounts. Therefore, conducting interviews with expert informants was chosen in order to move the research project forward and meet the anticipated timeline.

These aims are achieved through the analysis of primary and secondary data through a SPT lens with a view to finding pathways for more fundamental and long-lasting change. The following sections introduce the research questions and methodology employed to achieve these research aims.

1.6 Research Questions

The overarching research question of this thesis reads as follows: In what ways can Social Practice Theory (SPT) contribute to a better understanding of household recycling practices in Australian metropolitan areas? To answer this overarching research question, three sub-research questions are explored:

RQ 1: What are the a) drivers of and b) barriers to household kerbside recycling practices?

RQ 2: What are the perceptions of environmental practitioners in relation to a) policy and b) practical measures that seek to improve household kerbside recycling practices?

RQ 3: In what ways can newly implemented recycling schemes such as the Western Australian Container Deposit Scheme contribute to the enhancement of recycling practices?

In this thesis the term ‘environmental practitioners’ covers a broad definition of industry-related stakeholders including policy makers, environmental educators, academics, private businesses, and other industry influencers.

1.7 Research Methodology and Scope

This thesis applies a qualitative approach consisting of three qualitative phases to analyse Australian kerbside recycling and CDS practices. These three phases consist of document analysis, expert interviews, and a case study. Phase 1 (document analysis) and Phase 2 (expert interviews) are conducted to address research questions 1 and 2 by investigating kerbside recycling behaviours at the household level, including any drivers and barriers, and current policy and educational directions

to improve such behaviours. A first aim of these two phases of the analysis is to 'zoom in' (Nicolini, 2009) on elemental dynamics of recycling practice. A second aim is to investigate how interventions applied by authorities to improve such dynamics unfold in response to addressing the problem of underperforming household recycling rates. The analysis of the data builds on principles of SPT to understand how household recycling practices entail the reproduction of cultural meanings, socially learnt skills, and common materials (Spurling et al., 2013) and are rooted within a variety of interconnections of other related practices (Schatzki, 2018). Phase 3 (the case study of the newly introduced Western Australian CDS) equally builds on SPT analysis to provide insights into residents' adaptation of their kerbside recycling practices in order to advance household recycling by separating beverage containers, addressing the third research question. The benefits and rationale of these three phases are described in detail in Chapter 4.

While the initial scope of this thesis included direct observation of household recycling practice, this was not possible due to the Covid-19 pandemic. The exclusion of observations might appear as a limitation of the study; however, through an extensive sample of virtual expert interviews (42 interviews in Phases 2 and 3) underpinned by the analysis of documents (including survey results of more than 5000+ participants in Phases 1 and 3), the required amount of data richness is achieved to analyse household recycling practice. The adaptability of the research is further examined in Chapters 4 and 7.

1.8 Significance of the Research

Household recycling is an environmentally significant behaviour, as "disposing of household waste, directly or proximally causes environmental change" (Stern, 2000, p. 408) due to its effect on the availability of natural resources. This research is significant as it seeks to address the general lack of studies on household practices and their environmental impact as a unit of analysis (Gorman-Murray & Lane, 2012; Raven et al., 2021). Furthermore, it is a response to the specific need for more research on household recycling, viewing it as a social practice.

Considering the pressing challenge to increase recycling rates to reduce the threat of pollution to human health and the environment, research on the social dimensions of recycling is surprisingly limited, both internationally and in Australia (Knickmeyer, 2019). There is a dearth of research regarding Australian household kerbside recycling policy and practices (Jones, 2020b). Governments and scholars identify the need for further analysis of kerbside recycling, specifically the drivers of contamination rates and effectiveness of recycling interventions (Agarwal et al., 2020; Kaufman et al., 2020). This thesis addresses these topics, contributing to a further understanding of household kerbside recycling.

Secondly, and more specifically related to studies on the evaluation of beverage packaging recycling programs (CDS) and their contribution to pro-environmental behaviour change (PEBC), “CDS performance varies between countries and regions; thus, there is a demand for location-specific research to explore how CDS programs have been utilized” (O’Dwyer et al., 2022, p. 5). Despite the introduction of such schemes in many jurisdictions in Australia, “there is limited research and information evaluating the existing scheme[s]” (O’Dwyer et al., 2022, p. 5). This is even more significant considering the underperforming CDS rates in many Australian jurisdictions. This research seeks to address this gap by investigating CDS practices in Western Australia (WA).

Thirdly, the behaviour-related challenges of recycling are a key topic for global environmental policy (OECD, 2008). A review of the international body of literature on household kerbside recycling and CDS practices indicates that most researchers apply psychology-based models and concepts to understand human behaviour (Ramayah et al., 2012; Tonglet et al., 2004). However, a recent new stream of environmental literature building on the concept of practice argues this orientation leads to a rather narrow understanding of social life and how it evolves over time. Conversely, practice researchers suggest that a broad range of environmental issues may instead be understood through the concept of practice (Shove et al., 2012). For example, recycling schemes (such as circular business models) and their desired outcomes in the context of practice change should be investigated through a practice lens (Borrello et al., 2020). This thesis pays special attention to the concept of practice in order to better understand underperforming household kerbside recycling and CDS

practices in Australia. By adopting a practice perspective, this research specifically aims to make four key contributions to the literature on SPT in the field of environmental research.

The first contribution is the novel application of SPT to the recycling related body of research literature. This contrasts with the traditional theoretical lens that builds on purpose- and norm-oriented studies. This will shift the analysis of recycling away from conscious attitude and belief driven analysis to the analysis of recycling as a practice and an automated way of life (Reckwitz, 2002).

Secondly, by bringing SPT into the dialogue of household recycling, this thesis fills a gap in the international body of SPT literature by extending its theoretical considerations to a novel environmental issue[5]. For example, at the analytical level of SPT, this research aims to examine the elements (competencies, meanings, and materials) (Shove et al., 2012) that produce recycling practices and thus generate new insights and explanations of what is empirically apparent. Furthermore, it is aimed to illuminate what role recycling practices plays in the "wider socio-cultural, political, economic, and material developments in which demand enmeshed" (Watson et al., 2020, p. 2).

Thirdly, by building on identifying elements of practice, this research aims to visualise the arrangements of core elements and linkages of underperforming household kerbside recycling practice scenarios and discuss them in a practice-based context. This will advance the discourse by helping stakeholders to think more critically about simplistic assumptions behind recycling practices and possibly re-evaluate current educational approaches to improve the practice in Australia and internationally.

[5] A comprehensive search of three major global reference databases found no reference to other peers researching household recycling practices applying SPT (data base search from 31/01/2022). Therefore, this statement was made to the best of the author's knowledge.

Fourthly, this research contributes to the limited practice research in the context of environmentally significant behaviours in Australian households. Only a handful of researchers such as Strengers and Maller (2011), Breadsell et al. (2019), and Lindsay et al. (2022) explore this area, with a focus on the reduction of domestic resource use or the effect of the pandemic on building more sustainable domestic practices. This thesis contributes to the dialogue by introducing SPT to another environmental issue in Australian households, namely underperforming household recycling practices.

The findings of this practice-driven investigation cannot be regarded as blueprints of certain behaviours but rather they "praxeologise" (Nicolini & Monteiro, 2016, p. 3) the social phenomena, recognising that it emerges from, and transpires through, complex constructs of interwoven concrete practices and elements of practice.

1.9 Thesis Structure

This thesis is divided into seven chapters. The current introductory chapter, Chapter 1, outlines the author's personal motivation for conducting the research and the parameters of the thesis, including important definitions, background, and the research questions that are key to the analysis. Furthermore, the study methodology and significance of the findings are set forth.

Chapter 2 grounds the research, exploring the established household recycling system and industry in Australia and the associated roles and responsibilities at federal, state, and local government levels as they both play significant roles for the success of recycling. The chapter also sets out recent developments and new goals pertaining to the development of the industry landscape.

Chapter 3 presents a theoretical overview of Social Behaviour Theories and their traditional use to analyse household recycling behaviours, internationally and with examples in Australia. Particular attention is given to the reinvigorated theoretical stance — SPT — to analyse environmental issues invoked in the analysis of household recycling in order to address the research questions. The chapter outlines

the role of SPT within government debates and introduces three concepts for the design of practice-based intervention strategies (recrafting practice elements, substituting practices, and interlocking practice entities) that have the potential to inform recycling-related recommendations in the Australian context.

Chapter 4 details the methodological approach regarding the three phases of the research: secondary data analysis, expert interviews, and a case study analysis. Chapter 5 presents the findings in the context of contemporary Australian household recycling practices retrieved from analysis of key texts, expert opinions, and recycling scheme outcomes. Chapter 6 discusses the main research findings of the data analysis in a practice-based context and considers their implications to answer the main research question.

Chapter 7 concludes the thesis by highlighting the key research findings and outlining potential recommendations to mitigate the research problems based on the discussion in Chapter 6. Limitations of the study are also acknowledged. The chapter closes by identifying areas for further research that might illuminate future studies in this area.

Chapter 2: Australian Household Recycling

2.1 Chapter Overview

This chapter provides an overview of the regulation of household recycling in Australia. Section 2.2 outlines the flow of recyclables through the existing household kerbside system and the associated industry landscape. Section 2.3 discusses key regulations and responsibilities at federal, state, and local government level. Finally, Section 2.4 concludes with a chapter summary.

2.2 Household Kerbside Recycling

Douglas (1966) notes that "where there is a system, there is waste." The Australian household kerbside recycling system provides a dedicated bin for the disposal of recyclable materials. This concept is aligning with the third or mid-rank principle of the waste hierarchy (see Figure 1.1). This residential system includes the processes of at-home sorting, collection of materials, and sorting of such materials at waste facilities. Section 2.2.1 describes these three steps and identifies contamination that occurs throughout the process, leading to the loss of valuable resources to landfill. Section 2.2.2 discusses recent international industry disruptions affecting the market for sorted kerbside recycled materials and their consequences in the context of the research problem.

2.2.1 The 2-Bin Kerbside System

The 2-bin kerbside system has been the standard system for the collection of waste and recyclables in Australia since the 1980s (Department of Agriculture, Water and the Environment (DAWE), 2020; Waste and Circular Economy Collaboration, 2020). The Australian 2-bin kerbside system includes one general waste and one co-mingled recycling bin (Moloney & Doolan, 2017). In metropolitan areas[6] this standard is generally classified as a comprehensive solution that offers good coverage (Government of South Australia, 2015). Globally, the collection of MSW happens in various shapes and forms: formal and informal, convenient, and inconvenient, by private and public bodies, with payment of fees, by weight, by volume, by collection

[6] Australian rural, regional, and metropolitan areas have varying levels of kerbside services and systems of provision.

cycle or indirectly through local taxes (Zaman & Lehmann, 2011: Hall & Zapata Campos, 2013; Lakhan, 2015). There is no scholarly consensus on a single best collection system for every environment, considering local differences and the overlap of the service with other varying areas of the social-technological world (such as production, consumption, culture, built infrastructure, processing infrastructure, markets, habits, governance, and social indifference).

Waste Sorting: The overall Australian MSW stream that goes through the 2-bin kerbside system (545 kg per capita) (Blue Environment, 2022) of an Australian household mostly contains organic/non-recyclable materials (e.g., food, soft plastic[7], and nappies) and recyclable materials (metals (aluminium and steel), paper/cardboard, rigid plastic, and glass) (Australian Bureau of Statistics, 2020). The 2-bin system requires Australian residents to place their organic and non-recyclable materials (general waste) into a red lidded or general waste bin and place their recyclables into a yellow bin (DEE, 2018). The fact that in a standard scenario there is one co-mingled recycling bin for a variety of recyclable materials allocates less responsibility and causes less inconvenience for residents. However, studies show that generally, the greater the provision of bins for source separation, the cleaner each material stream. In the context of this research this means that in systems "where sorting is closer to the source [here the household domain] and recyclables and wet fractions like kitchen waste are separated at an early stage, higher quality waste materials can be extracted" (Miliute-Plepiene et al., 2016, p. 40). Some local governments (LGs) offer additional recycling bins for residents. For example, some

[7] There are seven types of commonly used plastics: acrylic or polymethyl *methacrylate* (PMMA), polycarbonate (PC), polyethylene (PE), polypropylene (PP), polyethylene terephthalate (PETE or PET), polyvinyl chloride (PVC), and acrylonitrile-butadiene-styrene (ABS). PP, PET, and PE are most popular for the manufacturing of consumer goods and packaging and can be classified into four densities (low, medium, high, and ultra-high) (A&C Plastic, 2023). In the Australian waste industry, low and medium density PP is classified as soft plastic and can only be sorted at a few recycling plants (MRFs). High and ultra-high PP is classified as rigid plastic and is processable at most MRFs (Hossain et al., 2022).

LGs provide green bins for the collection of garden organics (GO)[8] or food and garden organics (FOGO). The federal government has proposed the addition of FOGO bins to the standard 2-bin kerbside system in metropolitan areas (Australian Government, 2019). However, a systematic roll-out of the additional service has not yet been implemented. Some LGs also offer blue bins for the collection of paper/cardboard or purple bins for glass. Recycling single separated material streams is more straightforward compared to a mixed stream. For example, paper is normally of high-quality and can be reprocessed. However, the provision of additional kerbside bins for source separation is inconsistent across local governments in Australian jurisdictions (Agarwal et al., 2020). Therefore, the Australian household recycling stream can generally be classified as co-mingled. Therefore, the stream comprises low-grade materials as the approach of a mixed collection generally reduces the market value of the materials (Morris et al., 2005).

Waste Collection: Household waste and recyclable materials are collected by waste trucks for transport to landfill (red bin) or to a Material Recovery Facility (MRF) for sorting (yellow bin). General waste comprises the majority of waste volumes generated by Australian residents. The latest National Waste Report reveals that Australian residents send on average 5.2 Mt of waste to landfill, compared to 1.8 Mt of recyclable materials collected through the co-mingled yellow kerbside recycling bins. The volumes coming through kerbside recycling are declining, and have nationally reduced by 0.1 Mt between 2020 and 2022 (Blue Environment, 2022). Similarly, the volume of MSW has decreased by -2.4% on a per capita basis over the period 2006-07 to 2018-19 (DAWE, 2020). A similar phenomenon is observable in other developed nations, including Japan (MoE, 2014), Singapore (NEAS, 2020), Germany (FMENCN, 2018), and the USA (US EPA, 2020). Despite a growing population and rising consumerism, both nationally and globally (Blue Environment, 2020), declining kerbside recycling rates can partly be explained due to the phenomenon of global digitisation (less newsprint), manufacturing technology (more

[8] The provision of GO bins in metropolitan areas is widespread. In 2018/19 in NSW, 26 out of 33 metropolitan LGs offered the service to their residents. FOGO on the other hand is not very common (NSW EPA, 2020).

resource efficient production), and advances in material design (smaller, lighter, multi-functional, etc.) (Hoornweg et al., 2013).

Contamination: The kerbside recycling stream generally contains high levels of contamination. Contamination occurs at the start of the kerbside recycling process when residents sort and dispose of materials into the yellow bin that are not accepted by MRFs for the sorting process. Common examples include soft plastic[9], bagged recyclables (Kaufman et al., 2020), "glass fines, electronic waste, nappies, textiles and organic waste" (CSIRO, 2021). Publicly available sources confirm that household recycling bins show notoriously high contamination levels, generally far greater than a standard of 5% (DWER, 2019) and in some cases, up to 30% (Chang, 2022)[10]. Contamination can also take place through the collection process by compacting co-mingled recyclables in the moment of collection (e.g., broken glass) (DEE, 2018). However, optimal compaction rates are typically negotiated between LGs, the collection company, and the MRF to reduce the likelihood of contamination through compaction (APC Environmental Management, 2012). Contaminants entering the recycling stream degrade the value of other recyclable material in bins and trucks and can clog up local sorting machinery (Planet Ark, 2018). Therefore, contaminated materials and contaminants are usually excluded from the co-mingled stream and are sent to landfill. This exclusion happens at MRFs, where the co-mingled stream is supposed to be sorted into material fractions. On average, MRFs send 20% of the materials they receive to landfill (Blue Environment, 2022). The general trend of high contamination rates in co-mingled recycling streams is also confirmed by international research that demonstrates "where waste sorting takes place in centralised sorting facilities, the amount and value of recyclables are lower, while a higher share of processed waste ends up in landfill" (Miliute-Plepiene et al., 2016, p. 40). The historical

[9] Soft plastic within consumption systems (often single-use plastics) are the most difficult to recycle as they often contain several types of plastic. Therefore, a local processing industry for soft plastic in Australia was never developed and MRFs do not include the technology to separate soft plastic in their sorting process (CSIROscope, 2023).

[10] For example, the proportion of contaminants (also called rejects) in NSW was 10.6% in 2018/2019 (NSW EPA, 2020).

lack of high-quality feedstock coming from the MSW stream has negatively affected the developing industry landscape for reprocessing and remanufacturing facilities that process recycled materials from the kerbside stream, including “paper and cardboard, plastic, metal, glass and organics” (Commonwealth of Australia, 2018, p. 15). Therefore, Australia’s waste and resource recovery (WARR) industry landscape is underdeveloped, especially regarding the processing of plastic. This underlines the importance of the reduction of contamination rates to improve “the quality of recycled material we produce” (Commonwealth of Australia, 2018a, p. 14). Reducing contamination is essential to help build demand and markets for recycled content in products, goods, buildings, and infrastructure for government, business, and residents. The next subsection discusses recent international market disruptions imposing new challenges for the underdeveloped WARR industry landscape.

2.2.2 Industry Landscape for Kerbside Recyclables

Previously, a key component of the household kerbside recycling process (after sorting materials at MRFs) used to be the export of sorted materials to countries in Asia (Jones, 2020a; Parliament of Australia, 2021). As a result, the local industry landscape for reprocessing of recycled material and markets for products made of recycled content is underdeveloped, particularly for plastics. This became a significant issue in 2017 when China announced a new policy called ‘National Sword’ (also referred to as ‘China Sword’), changing the import allowance for low-grade recyclables such as those from co-mingled streams.

The China Sword: From 2018, the China Sword policy dramatically decreased the contamination limits for low-grade recyclables from 5% accepted pollutants down to 0.5% for both scrap paper and scrap plastics (State Government of Victoria, 2020). In a second step, from January 1, 2021, the Chinese Government banned all imports of solid materials. Prior to the announcement of the China Sword, Australia sent 1.25 Mt of recyclable material to China each year (Pickin & Trinh, 2019). Enactment of the policy effectively banned the import of low-grade recyclables from Australia, with 99% of kerbside recyclable volumes failing to meet the purity requirement (Planet Ark, 2018; Ritchie & Cocks, 2018; Topsfield, 2018). The universal ban was justified by the

Chinese government to protect the country's ecological environment by preventing pollution caused by imported low-grade waste volumes, which peaked at nearly 60 million tonnes before the ban[11] (People's Daily, 2020). Soon after China, other low-income countries such as Malaysia, Vietnam, Thailand, and India introduced similar regulations. The new regulations and their subsequent management and policy challenges sent a shock wave through governments and industries, not only in the case of Australia but many other waste export countries including Canada, France, Spain, and the US (Jones, 2020b). The impact of the China Sword on Australian residents' attitudes and behaviours is further investigated in the field study of this thesis.

Consequences of the China Sword for Australian Kerbside Recycling: Until 2018 the bulk of MRF feedstock was predominantly exported to Chinese buyers (DAWE, 2020) with only some processed locally (mostly metals[12], paper, and cardboard) (Clean Energy Finance Corporation, 2021). Figure 2.1 provides a visual representation of the standard material flow within the standard 2-bin system prior to the China Sword.

[11] China stimulates the country's rapidly expanding economy by using its own secondary resources for Chinese manufacturing industries that demand large volumes of raw materials in their production processes (People's Daily, 2020).

[12] Due to their material characteristics, metals such as aluminum or steel can be sorted into high-quality feedstock at MRFs and their upstream recycling process continues to perform strongly in Australia, as the demand is strongly driven by the building industry (Department of the Environment and Energy (DEE), 2018).

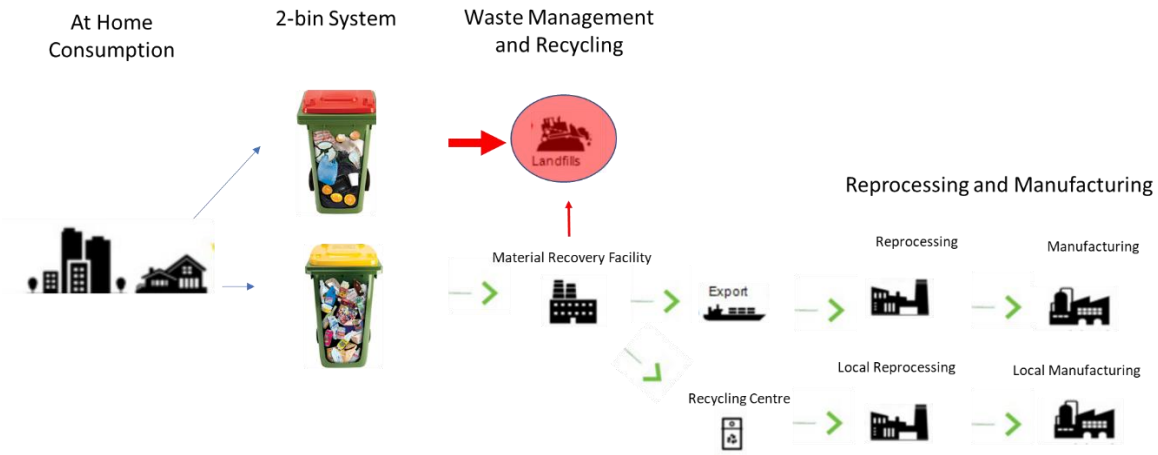


Figure 2.1: Snapshot of Source Streams, Material Management, and Markets for Household Waste Disposed through the 2-Bin System. Source: DEE (2018).

To understand new challenges related to the China Sword, it is important to further explain the classification of recyclables coming from the co-mingled kerbside stream. They are generally classified as low quality not only due to high levels of contamination caused by co-mingled collection but also due to the existing design of MRFs for the requirements of the international export market. The demand of Chinese buyers was previously high for cheap low-grade feedstock for their own further processing and re-manufacturing. To serve this demand, MRFs utilise a high-speed sorting process reliant on low-cost design; however, this is incompatible with state-of-the art recycling technology (CSIRO, 2021). Nationally, there are 94 MRFs in Australia that each have the capacity to process between 10,000 and 100,000 tonnes of co-mingled materials, but these MRFs are only capable of producing low-grade material streams (DEE, 2018). A consequence of Australia's historical reliance on export markets is the underdevelopment of onshore processing and re-manufacturing capacities. Since the enactment of the China Sword, this has become a significant management problem for thousands of tonnes of low-grade recyclables coming from MRFs, resulting in more waste going to landfill (Parliament of Australia, 2021; Wigley et al., 2019). In the context of rigid plastic, for example, there are very few onshore processing options and little-to-no market for them once recovered (Clean Energy Finance Corporation, 2021). In light of the fact that Australia is the largest plastic waste generator in the world after the United States (Blue Environment, 2020), the inability to sort and process soft and rigid plastics has become a pressing issue. The ABS reveals that out of the three major waste streams, households are the largest contributor to plastic

waste, generating almost half of the nation's plastic waste volumes (47%) (Australian Bureau of Statistics, 2020). In the wake of these challenges, the Federal Government is encouraging State and Territory Governments to re-think their domestic WARR practices and build a landscape for better resource recovery, including kerbside recycling of MSW (Commonwealth of Australia, 2018a). However, due to a lack of certainty in better quality feedstock, markets for recyclable materials are underdeveloped. This is underpinned by a lack of national leadership and regulatory frameworks within the Australian WARR. Therefore, industry investors are reluctant to make investments in building new landscapes that refine recycled materials into a raw material or recyclate (Wigley et al., 2019). Understanding this context is important, as the current industry challenges could potentially affect at-home recycling behaviours.

The following section outlines key regulations and the roles and responsibilities of federal, state, and local governments to shape household recycling practices in the wake of global market disruptions.

2.3 Household Recycling Regulations

The Australian WARR industry is guided by a multiplicity of rules and regulations, including international agreements such as the Basel Convention (1989) for hazardous waste and the Stockholm Convention (2004) for persistent organic pollutants. Both conventions were significant turning points signalling change in WARR regulations in several countries (Department of Climate Change, Energy, the Environment, and Water (DCCEEW), 2021a). In the Australian context, the conventions imposed obligations to take suitable provisions for both types of waste, including their reduction and disposal considering social, technical, and economic aspects (Australian Government, 2009). Further obligations in the context of the Australian WARR industry are shaped by Commonwealth laws at the federal government level, state and territory government laws and policies, and local government frameworks (Australian Government, 2009). Therefore, in Australia, all levels of government (federal, state, and local governments) are directly involved in WARR, generating a level of complexity in the overall process (Parliament of Australia, 2019). Jones (2020a) refers to this as a multi-level governance or regulator approach in which Australian federal, state and territory, and local governments design the WARR industry framework by

setting directions through legislation, policies, strategies, action plans, targets, etc. However, due to a lack of joint action, Jones (2020a, p. 223) indicates that this approach is typically “inefficient and costly for business and consumers”.

Figure 2.2 breaks down the responsibilities of federal, state and territory, and local governments. At the federal government level, these include responsibilities relating to international obligations, national leadership, and setting national targets (Commonwealth of Australia, 2018b). State and territory governments design individual strategic directions to achieve the national targets, while local governments steer WARR operations and services following state-based directions to achieve national targets (State Government of Victoria, 2020).

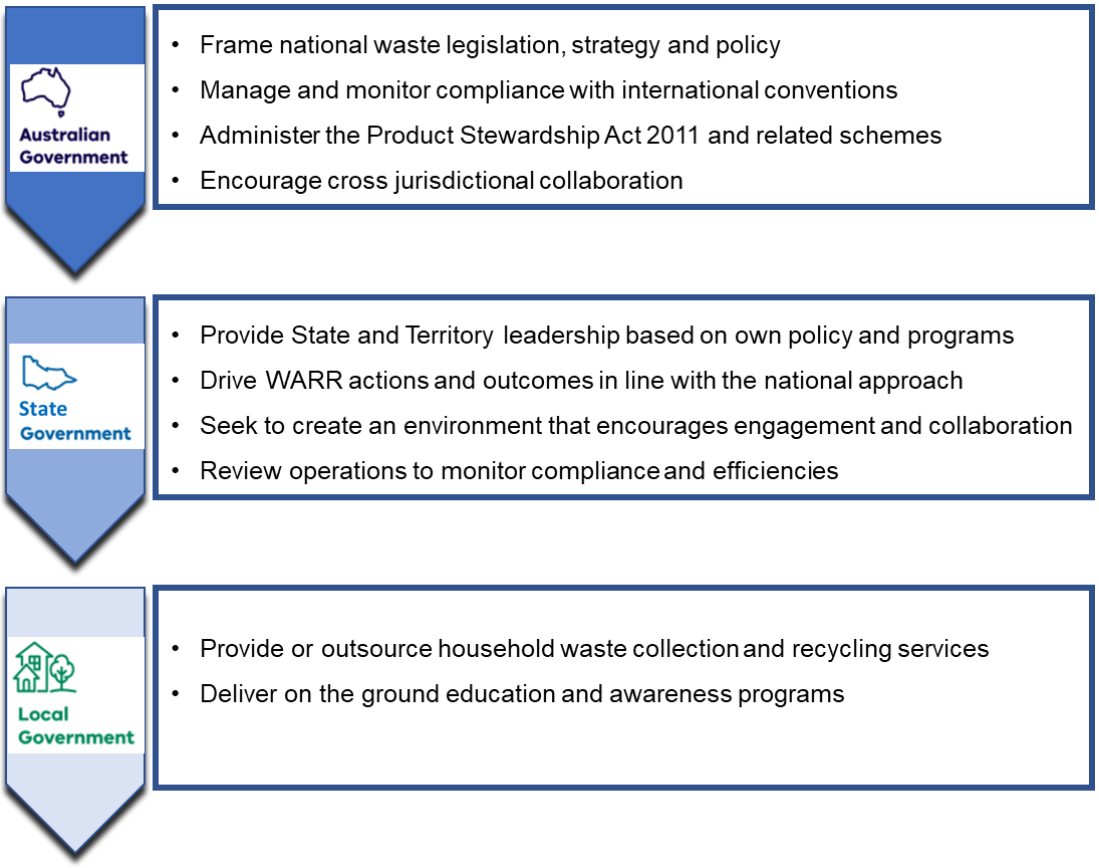


Figure 2.2: WARR Multi-level Governance. Based on Government of Western Australia (2020), State Government of Victoria (2020), Government of South Australia (2015), and Queensland Government (2019).

The next three subsections give a detailed overview of the federal, state and territory, and local government responsibilities (shown in Figure 2.2) and their actions in relation to household recycling.

2.3.1 The Federal Government

The federal government is responsible for meeting international obligations regarding waste that build the constitutional foundation for national legislation (Commonwealth of Australia, 2018b). The first national approach to WARR was established under the 1992 National Strategy for Ecologically Sustainable Development, aiming to reduce environmental harm and increase the efficient use of resources. In 2009, the national approach was renewed under the first National Waste Policy (NWP), outlining 11 sustainability principles to continuously improve WARR (Australian Government, 2009). However, such principles did not have a legislative effect and functioned more as a roadmap for state and territory governments. In 2018, the federal government revised the NWP in response to requests for stronger leadership and improved environmental policies and guidance (Commonwealth of Australia, 2018a). This was predominantly driven by increased media exposure of the waste industry after international market disruptions (China Sword) that revealed the challenges of the event for the underdeveloped sector. The revised NWP focuses on transitioning to a circular economy by building a national industry landscape for the WARR industry based on the key principles of the waste hierarchy (Parliament of Australia, 2021). It also outlines high level targets and indicates roles and responsibilities for collective action to achieve this transition. Although revised in 2018, researchers such as Jones and Roberts (2020a) criticise the political priorities within the NWP, referring to it as functioning more like a statement of intent rather than providing tangible direction to enforce objectives, as it fails to make solid commitments around targets, financial support, and strategic planning. The NWP has also drawn criticism from environmental groups, industry stakeholders, recycling associations, and residents (Roberts, 2018). In response, for the first time in Australian history, WARR became a federal election promise in 2019, leading the new coalition government to generate a National Waste Policy Action Plan in May 2019 (NWPAP, 2019). The NWPAP was prepared collaboratively by the federal government, state and territory governments, and the Australian Local Government Association (ALGA) (Australian Government, 2019). The

NWPAP provides concrete details about actions and funding in addition to further explanation of the roles and responsibilities at national, state, and local levels.

In 2019, the federal government created the overarching role of the first Assistant Minister for Waste Reduction and Environmental Management, which was viewed as a strong signal in taking a greater leadership role (Jones, 2020b). Furthermore, the federal government is engaged in ongoing stakeholder discussions, for example with the Australian Council of Recycling (ACR) and the Waste Management and Resource Recovery Association of Australia (WMRR), about the goals defined in the NWP and NWPAP. Discussions with industry stakeholders led to the announcement of a federal budget (Recycling Modernisation Fund) of over $250 million AUD for a period of 10 years starting from 2020-21 (DCCEEW, 2022) to turbo-charge Australia's recycling industry by building infrastructure, accelerating research, and improving waste data collection to transform to a circular economy (Parliament of Australia, 2021). So far over $100 million of government co-funding and third-party funding have brought to life 94 projects that have been announced, are under development, or have been completed (DCCEEW, 2023b). However, to the best of the author's knowledge, there is no publicly available information regarding the updating of low-grade sorting technology at MRFs and aligning standards across jurisdictions. The following paragraph describes the inherent complexity in the development of an aligned recycling system in Australia.

Ample authority remains with states and territories: Leaving significant responsibility for environmental policy within the ambit of state and territory governments (Jones, 2020b) has led to a "lack of consistency across jurisdictions in consumer education, industry standards, and waste governance" (CSIRO, 2021, p. 3). The federal government recognises the value of giving authority to state and territory authorities as they are best positioned to make decisions at a local level (Commonwealth of Australia, 2018a; DAWE, 2020). In the context of recycling, this has led to a multitude of state regulatory frameworks and a level of complexity that involves numerous pieces of legislation, policy, strategy instruments, and targets (Jones, 2020a, 2020b). To address such underlying complexity yet retain power with states and territories, the

federal government has suggested more jurisdictional collaboration and harmonisation of WARR approaches and systems. However, this remains difficult to achieve due to the lack of existing alignment within historically grown systems, processes, and approaches, which imposes a significant constraint on the development of an aligned WARR industry at the national level. This complication is an ongoing discussion point at the annual Environmental Minister Meeting (EMM). On the 21st of October 2022, the Commonwealth Minister for the Environment, and the Environmental Ministers from each Australian state and territory, agreed to expand the NWPAP within the next 12 months to strengthen efforts towards alignment of systems. Such efforts are crucial to achieve a range of targets, including the national 80% resource recovery target anticipated for 2030 (Australian Government, 2019). This target is directly related to the research problem of this thesis as it indicates the need for increased recycling rates for each of the core waste streams, including MSW. State and territory governments generally align with national targets, such as improving WARR systems and promoting collective action to achieve 80% resource recovery. However, according to an Inside Waste report from 2019, many jurisdictions focus on prioritising their own approaches, which is a major cause of misalignment of waste-related systems, processes, and procedures. Further, while the NWPAP outlines a promising plan to achieve alignment and funding for initiatives, in the context of MRF technologies, stakeholders criticise the voluntary nature of the plan, calling for a stronger enforcement approach (Sloan, 2023).

Australian Scheme for Plastic and Packaging: To improve the quality and quantity of our household recyclables, the federal government introduced the National Product Stewardship Act in 2011 (Australian Government, 2011). This framework provides guidance for a number of Extended Producer Responsibility (EPR) schemes. In 2018 this Act was updated to include voluntary regulations for the Plastic and Packaging scheme, which aims to hold packaging producers responsible to minimise waste, increase recycling rates, and reduce litter (DCCEEW, 2023a). Accreditation and administration of the scheme are managed by the Australian Packaging Covenant Organisation (APCO) and monitored by the federal government. Since 2018, APCO has signed up 1,500 members and introduced an on-pack label called the Australasian Recycling Label (ARL) for its members to include on their packaging. The purpose of

the label is to guide consumers regarding how to recycle an item or different components of an item at home appropriately in their day-to-day waste sorting and separation activities (Australian Packaging Covenant, 2022; State Government of Victoria, 2020). Therefore, “the communication link between consumers and companies is the recycling label on the package this enables consumers to sort their waste and determine whether to send a used packaging item to landfill or to a recycling waste bin” (Alzadjali, 2010, p. 4). As a widespread instructive tool, the ARL is publicly promoted through social media campaigns and signage in public places such as airports. Initiatives such as the ARL initiative are considered essential to facilitate better household kerbside recycling practices among the general population. However, Buelow et al. (2010) suggest that an abundance of such programs can lead to consumer resistance. In the Australian context, the advantage of the ARL is that it is a nation-wide on-pack labelling scheme with the goal to be applied across 80% of all supermarket packaging by December 2023 (Australian Packaging Covenant, 2022). This goal is underpinned by the national target for 100% of Australian packaging to be recyclable, compostable, or reusable by 2025[13]. However, the use of the logo is not mandatory for APCO members (Australian Government, 2021).

In 2022 APCO received accreditation by the federal government, becoming a co-regulated arrangement for Plastic and Packaging within the range of other product stewardship schemes (DCCEEW, 2023a). However, international agencies that specialise in global environmental compliance, including meeting the needs of global EPR schemes (e.g., LORAX EPI) assess the Australian Plastic and Packaging arrangement as "rather prescriptive”, as all “producers are not legally responsible for the management of packaging waste, but those above a certain turnover must sign up to the Packaging Covenant or they will be subject to the National Environment Protection Measure (NEPM), which authorises local governments to recover the cost of waste management from the brand owner's consumer packaging” (Hu, 2021, p. 1). This judgement is reinforced by the coordinating body of the initiative, APCO itself, who in April 2023 made "a call to action” that “outlines [the need for] a stronger co-

[13] Further targets are related to export bans of waste, the reduction of waste generated, the use of recycled materials, plastic and organic waste, and waste data.

regulatory framework [including] a long-term vision, collaboration across the entire packaging system, and strong and coordinated interventions for essential material streams" (Wheeler, 2023a, p. 1). This further demonstrates that federal government targets might be at risk due to the minimal degree of enforcement of its regulations.

2.3.2 State and Territory Governments

State and territory governments exert a regulatory responsibility. Australian jurisdictions regulate domestic WARR by determining licencing conditions for processing facilities, storage facilities, landfill disposal, and transportation. They also impose landfill levies, design incentive systems for recycling, implement environmental protection measures, and provide information to the public. In response to federal government recommendations, Australian state and territory governments have revised their WARR strategies, including principles of the waste hierarchy (see Figure 1.1), to ensure that waste is safely managed and to promote a transition to a circular economy (Commonwealth of Australia, 2018a). This advice has also influenced waste strategies for First Nation communities. The Queensland state government developed an additional strategy that includes several actions to ensure that Indigenous communities become important contributors in relation to the state's waste reduction and circular economy ambitions, especially in rural and remote areas (Queensland Government, 2021). The call for the transition to a CE led to an abundance of new state-based programs to improve WARR, including actions to achieve better household recycling rates (Commonwealth of Australia, 2018b). This section outlines two regulatory frameworks applicable in most Australian jurisdictions: the impact of waste charges and the introduction of a CDS. Both frameworks have a direct impact on the research problem, namely underperforming recycling practices.

Landfill Levies: Landfill levies are applied at state and territory level and can have a direct impact on local recycling outcomes. In general, landfill levies refer to the cost of landfill disposal paid by a licensed waste facility. Levies have a direct impact on recycling as the cost of landfill disposal ($AUD per tonne of waste) determines the economic incentive to divert waste from landfill and instead send it to sorting and processing facilities (National Waste and Recycling Industry Council (NWRIC), 2019).

Australian jurisdictions all handle their levy systems independently from each other, leading to a variety of objectives for levy use and levy amounts. New South Wales (NSW) has the highest waste levy in Australia, with a metropolitan levy of $151.60 per tonne (NSW EPA, 2022a). Levies in WA, QLD, and VIC are less than half the NSW price per tonne, with WA charging $70 per tonne (DWER, 2020). This significant difference is likely linked to NSW's predicted landfill capacity problem in metropolitan areas over the next 10 years (Department of Planning, Industry, and Environment (DPIE), 2021). This has created clear commercial drivers owing to increasing levies (Clean Energy Finance Corporation, 2021). Although directly impacting the economic feasibility of recycling, this construct is not the focus of this thesis. Instead, this section focuses on the indirect impact levies can have on waste behaviours, such as financing local projects.

Levies can have an impact on residents' behaviour as they finance the development of local resource recovery businesses and recycling initiatives (including community education campaigns), ultimately impacting recycling capabilities and therefore the quality and quantity of recyclables that are delivered to MRFs (NWRIC, 2019). For example, the NSW levy finances a grant scheme called 'Waste Less Recycle More' (WLRM) to improve resource recovery (Insidewaste, 2019). The NSW grant scheme is the largest public investment ever made for WARR in Australian history ($802 million), delivering 3,347 projects between 2012 and 2022 (NSW Environment Protection Authority, 2022a). The scheme covers six priority areas to increase recycling and has dedicated $267 million in investment for infrastructure projects for councils and local businesses. This is an important example of state authorities taking responsibility to identify areas and players eligible to receive government financial support through the landfill levies.

Education is another important area financed by waste levies. The WA Waste Authority implemented a program called 'Waste Wise Schools' as part of their waste strategy (Government of Western Australia, 2022). Part of the initiative is the provision of waste sorting bins in schools to teach correct sorting behaviour. NSW utilised their levy to increase sustainability education by providing curriculum support and teaching

resources to schools. The NSW Department of Education provides online learning resources, including directions on how to conduct a waste audit at schools to identify waste composition and material contamination (NSW Government, 2022b). While the role of education at primary level is outside the scope of this thesis, it is an area that merits further research.

Australian Container Deposit Schemes: A Container Deposit Scheme (CDS) is an incentive-driven EPR (White, 2001a). CDSs have been successfully applied in developed countries to increase recycling rates, particularly in the context of plastic recycling (Carrington, 2018). Higher waste separation at the household level, such as through a CDS, produces cleaner material streams. Globally, CDSs are applied in 38 countries (Carrington, 2018) including many European countries such as Germany and Sweden, and various states in Canada and the US. The general aim of a CDS is to divert the increasing amount of beverage packaging, especially plastic, from landfill (Kang, 2015), prevent litter (White, 2001b), and recover value to reduce greenhouse gas emissions and virgin resource consumption (Zhou et al., 2020). In the context of environmental outcomes, Zhou et al. (2020, p. 2) note that a CDS can serve as a "desirable economic environmental instrument" by incentivising the return of eligible beverage containers to increase recycling rates and reduce environmental harm (Fullerton & Wolverton, 2000).

In Australia, CDSs are implemented at state and territory level to increase source separation and recycling rates and generate cleaner material streams (KPMG, 2020)[14]. The first CDS was implemented in South Australia in 1977 to prevent litter and increase resource recovery (White, 2001b). South Australia is a forerunner in sustainability with a CDS return rate of 76% compared to an average of 64% in other jurisdictions, partly explained by the longevity of the SA scheme (Blue Environment, 2022). Other states began to implement their own CDSs twenty-five years after SA,

[14] It should be noted that Australia also offers other forms of recycling schemes, such as those for hazardous waste (batteries), e-waste (mobile phones), and soft plastic collection at supermarkets. These schemes are not the focus of this thesis.

partly in response to “the rise of single-use aluminium cans and plastic bottles [and] increased littering” (Ketchell, 2015, p. 1). Over the last decade, CDSs have been implemented in the Northern Territory (2012), New South Wales (2017), the Australian Capital Territory and Queensland (2018), and Western Australian (2020). Schemes in Tasmania and Victoria are scheduled for 2023 (State Government of Victoria, 2023; Department of Natural Resources and Environment Tasmania, 2023). All Australian CDSs utilise an incentive of 10-cents per returned container in order to discourage people from placing containers in their at-home kerbside recycling or general waste bin, and instead collect and return them (KPMG, 2020; DWER, 2020). The infrastructure set-up of the scheme by each state varies slightly (e.g., the minimum amount of refund points and approach to material separation and counting, such as barcode reading vs manual counting) to reflect varying local realities, policies, and priorities. However, the basic scheme characteristics (such as return options[15], types of eligible containers, and refund amounts) are mostly aligned across states.

In order to address the slight differences between the schemes, such as “container size and products, standards for labelling, and community education”, State Environmental Ministers have agreed to work toward alignment across jurisdictions by the end of 2025, ensuring consistent schemes are implemented across all states (Wheeler, 2021b, p. 1). There is also ongoing discussion regarding a potential increase of the 10-cents return and an aligned expansion of the types of eligible containers (e.g., the inclusion of wine bottles) (Wheeler, 2022a; Wheeler, 2022b). However, this thesis focuses on the design of current schemes.

2.3.3 Local Governments

Local governments (LGs) oversee the process of household kerbside recycling and thus influence the quality and quantity of yellow bin materials. Local governments are

[15] Refund points licenced by the Scheme Coordinator are operated by independent organisations, either automatically based on Reverse Vending Machines (RVM), manually based on staff counting containers, or unstaffed and contact-free based on bag-drops (Alzheimer’s Research, 2022; Government of Western Australia, 2023).

the first point of information contact for communities regarding waste management (WALGA, 2020), as they provide a range of waste services such as street litter bins, street sweeping, and dumping services (Blue Environment, 2020). Local governments oversee the provision of the physical MSW infrastructure (minimum 2 bins), collection services, landfill disposal, transfer, recycling, and export of materials in line with state and territory regulatory frameworks (Commonwealth of Australia, 2018b; State Government of Victoria, 2020; Government of Western Australia, 2020). The minimum number of kerbside bins is provided in exchange for annual resident service fees[16] in metropolitan areas. The bin and collection services are either provided through LG owned and operated facilities or by sub-contracting private WARR operators (State Government of Victoria, 2020; Government of Western Australia, 2020). It is common for LGs to outsource operational activities to waste businesses from the WARR industry and to purely focus on monitoring operations and services. In 2022 for example, key WARR businesses included Bingo Industries, Cleanaway, J.J. Richards & Sons, and Veolia (Canstar Blue, 2022). This outsourcing approach to the collection and sorting of MSW materials from the kerbside system often leads to varying service agreements, including collection frequencies and number, size, and colour of bins. This strong focus on public-private arrangements to provide infrastructure and services (Government of Western Australia, 2020) has historically led to inconsistency in relation to recycling services across metropolitan areas, including varying waste education. This may be related to the research problem of underperforming recycling rates and is therefore further investigated in this thesis.

The lack of a streamlined local approach also affects the collection of comprehensive waste data. Therefore, states are beginning to leverage their waste policies, for example by mandating data recording for sorting facilities (MRFs). NSW now uses weighbridges to collect data on household waste generation (Blue Environment, 2018). WA recently implemented measures to improve their waste data, drawing on

[16] Such fees or taxes in the form of rates and revenue from the sale of goods and services to ratepayers funds the delivery of the 2-bin system. Furthermore, in the context of system improvement, funds can be granted by the federal or state and territory governments (NSW Environment Protection Authority, 2019).

12 tailored Waste Data Strategies (Waste Authority of Western Australia, 2022). However, neither of these Australian jurisdictions require LGs that operate under public-private arrangements to request contract amendments for their waste services, for example to impose further data collection requirements on private waste businesses (i.e., non-mandated reporting) (Commonwealth of Australia, 2018b). As such, there is a lack of data on household MSW composition or contamination as it is not contractually regulated between waste collection and sorting companies and LG authorities (Agarwal et al., 2020). In some cases, LGs run collection and sorting operations themselves. However, they often have limited resources to evaluate their own services, including volume and composition of kerbside waste (Jones, 2020a). Under such conditions the WARR industry faces a weak data and reporting base, with "details on recycling remaining largely guess work for many jurisdictions" (Jones, 2020a, p. 216). Therefore, at the recent National Plastics Plan launch in 2021, Federal Environment Minister Sussan Ley called for all state, territory, and local governments to work together to standardise kerbside collection systems to simplify data collection (Wheeler, 2021c).

In addition to arranging MSW services, metropolitan LGs run their own local education campaigns with the aim to improve the quality and quantity of materials coming through the household kerbside recycling system[17]. Some very proactive LGs also develop their own sustainability guidelines and run campaigns on litter and illegal dumping to steer communities towards a zero waste culture and circular economy paradigms (Government of South Australia, 2015). As the public interface for community education, it can be assumed that LGs have a key influence on environmental practices.

LGs have a crucial role in the provision of WARR services that requires considerable expertise. Despite this, waste educators have very few opportunities to access

[17] Additionally, LGs are expected to support higher level national and state and territory based initiatives including "product stewardship schemes or community education programs" (Commonwealth of Australia, 2018b, p. 22) such as CDSs.

professional education. An Internet search conducted on 24 March 2023 yielded sparse information on a small number of certificate courses. Significantly, the search indicates that there are currently no recycling and waste management courses in Sydney (Recycling and Waste Management Courses in Sydney, 2023). This observation points to an area of evident need and thus an avenue for future research.

2.4 Chapter Summary

The historical lack of strong leadership for the WARR industry by the federal government has allowed the emergence of a miscellanea of individual state- and territory-based laws and policies with different objectives, leading to an enormous diversity of industry processes, operations, and projects between governments. In the wake of the China Sword, the need to improve waste services for MSW collection to generate high-quality streams has assumed greater urgency (DEE, 2018), not only to improve local refining and reprocessing infrastructure and thus attract more investors but more generally to promote a circular economy.

However, multi-level governance has led to a disconnection of national WARR policy development within global practical realities as “there is a 'lag' between policy and practice which results in 'suboptimal outcomes' for waste and recycling” (Commonwealth of Australia, 2018b, p. 113). Therefore, Australia is currently still unable to address the gap between policy and industry practice. By recently setting federal objectives to achieve better industry outcomes, for example achieving an 80% national resource recovery rate along with a strong emphasis on building advanced local WARR infrastructure, the Australian government has acknowledged that consistent policy drivers at the different government levels are critical for the entire industry.

This challenge has received limited attention prior to 2017 due to Australia's historical reliance on the export of recyclable materials, and thus there is also a lack of research in the scholarly literature. This lack of research inevitably has a flow-on effect for industry development, policy, and regulation (Jones, 2020a) and underlines the significance of this thesis. The following chapter explores the role of social theory to

better understand peoples' mindsets and behaviours in relation to recycling practices and discusses the value of social theory to investigate the research problem.

Chapter 3: Literature Review

3.1 Chapter Overview

This chapter provides a review of the literature regarding how recycling behaviours promote pro-environmental behaviour change (PEBC) and examines the tenets and applicability of social practice theory (SPT). The chapter is structured as follows. Section 3.2 discusses two classical social theories of behaviour applied to improve recycling behaviours and posits that in the context of cultural theories, household recycling is an environmental practice interconnected to a network of everyday practices. Section 3.3 provides an overview of the original movement and contemporary shape of SPT as an alternative theoretical lens to understand everyday practice. This section also focuses on practice-based studies in the context of consumption practices, including household recycling. It should be noted that, to date, while SPT has been applied in many studies analysing environmental behaviours there are only limited such studies in the context of recycling (Beatson, Gottlieb & Pleming, 2020; Tyers, 2021). However, in the context of the analysis of co-mingled kerbside recycling behaviours and CDS participation, such behaviours have not been thoroughly investigated through a practice-based lens. Section 3.4 presents the Shovian framework for practice-based analysis that builds on the work of Elizabeth Shove and other theorists. Section 3.5 assesses potential alternative practice-driven intervention frameworks, drawing on a discussion of the theoretical and practical challenges authorities face when seeking to improve environmental practices. Finally, Section 3.6 concludes with a chapter summary.

3.2 Household Recycling and Social Theories

Social theories focus on the relationship between individuals and society with the aim to understand how social order can be explained and conceptualised in the context of society (Røpke, 2009). Locating SPT in the realm of modern social theories, Rechwitz (2002) points to three fundamentally different approaches to understand social order. The first two approaches, namely purpose-oriented and norm-oriented theory[18] (Figure 3.1), are categorised as classical modern social theories. The third approach

[18] These theories are grounded in the underpinning assumption of human rationalism or purpose orientation (homo economicus) (Tversky & Kahneman, 1981, in Laitos and Okulski 2015, p.6), and the norm driven action of homo sociologicus.

is a strain of theories categorised as cultural theories sitting in between purpose and norm-oriented theories (Reckwitz, 2002).

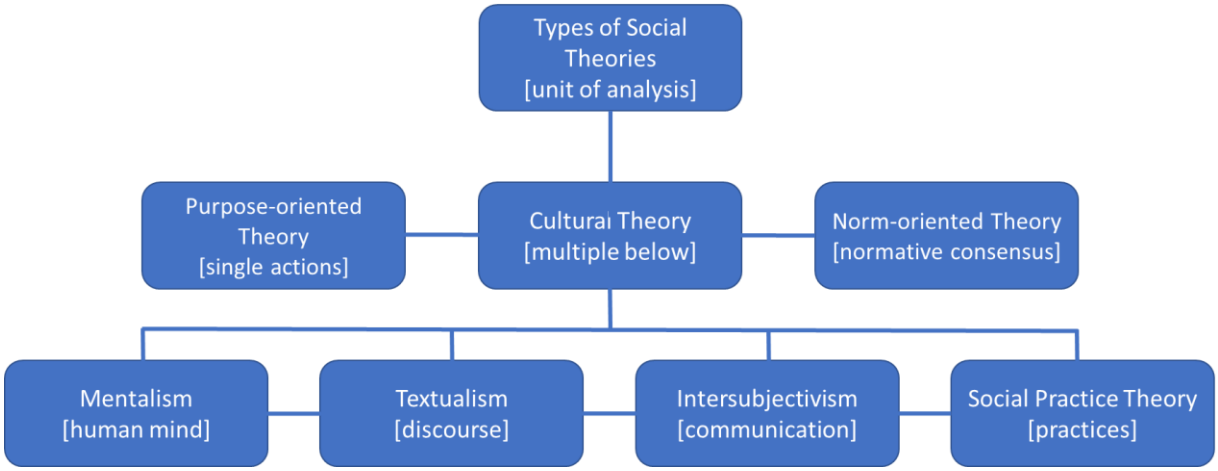


Figure 3.1: The Position of SPT within the Family of Social Theories. Based on Reckwitz (2002).

The next three subsections describe these different types of social theories. Both purpose-oriented and norm-oriented theories are traditionally used to understand recycling behaviours. Since many aspects of human life are still largely unsustainable (Shove, 2010), cultural theories have also emerged as a valid lens for analysing recycling behaviours.

3.2.1 Purpose-Oriented Theories

The aim of applying purpose-oriented theories across fields such as health, consumption, or sustainability, is to find ways to improve behaviours by investigating key factors such as values, attitudes, and norms to explain the motivation behind a behaviour in question (Strengers & Maller, 2015). The key concept of purpose-oriented theories is the economic theory of rational choice, which indicates that people perform individual behaviours based on the perceived costs and benefits of undertaking the behaviour (Darnton, 2008; Evans et al., 2012; Jackson, 2005). Darnton (2008) identifies over 60 models designed to change such perceptions. Two of the most commonly known frameworks are the value-belief-norm (VBN) theory (Stern, 2000) and the attitude-belief-choice (ABC) model. The latter springs from the popular theory of planned behaviour (Ajzen, 1991; Fishbein and Ajzen, 1975). Both models build on

a linear decision-making process representing the belief that the factors they are built on (e.g., values and attitudes) are the most influential means of changing a behaviour (O'Dwyer et al., 2022).

In the context of environmental research, the ABC model has informed a multitude of environmental behaviours such as sustainable transportation (Donald et al., 2014), energy consumption (Sweeney et al., 2013), and waste disposal and recycling behaviour (Ramayah et al., 2012; Tonglet et al., 2004). In its simplest form, the ABC approach believes **a**ttitudes are formed by **b**eliefs (perceptions and preferences) that build the rational foundation for individual **c**hoices (Darnton, 2008; Shove, 2010). Environmental attitudes can be influenced by raising environmental concerns to fill what is called an 'information deficit' (Burgess et al., 2003), for example about why some behaviours are bad for the environment. In recent decades, in the context of recycling, the broader literature in psychology considers attitudes towards waste management as an important variable of interest for improving behaviour (Hornik, 1995; Toan and Pham, 2021). In this broader context, many governments are bound to the logic of methodological individualism (Hampton, 2018) and remain attached to their predilection for tried-and-tested models that align with neoliberal approaches (Spotswood et al., 2017).

Initiatives that build on such models are common objectives of communication campaigns addressing attitudes by filling 'information deficits' about specific environmental concerns (Briguglio, 2016) with increasingly sophisticated communication techniques (Watson et al., 2020). Such campaigns transmit messages underpinned by moral suasion and persuasion techniques also known as persuasive sustainability (Brynjarsdóttir et al., 2012). In the context of kerbside recycling, many campaigns focus on the environmental concern of waste going to landfill by promoting the diversion of municipal waste from landfill (through recycling), including the application of the right separation or recycling skills (Briguglio, 2016). Accordingly, addressing attitudes and improving skills is considered an important and common goal in environmental policy (Briguglio, 2016). In Australia authorities view attitudes to recycling as predictors of change, with environmental practitioners mostly relying on

ABC driven initiatives, including promoting household recycling, local recycling depots or state-wide recycling schemes (Cooper et al., 2016) via traditional sender-receiver understanding (Halkier & Jensen, 2011). However, research indicates that such initiatives might only change simple behaviours over a short period of time. By extension, linear models are only deemed effective in relation to changing or adopting simple behaviours that require little confidence or skill (Knussen & Yule, 2008). For example, a waste reduction campaign in Devon (UK) in 2006 utilised media channels to increase residents' awareness of the negative environmental impact of increased resource use (Barr, 2006). Although individuals believed they wanted to reduce their waste generation, these beliefs did not yield tangible results. In environmental research the problem of individuals not following through with their actions despite embracing green values is commonly known as the 'value-action gap' (Barr, 2006; Blake, 1999; Shove, 2010), particularly regarding environmental consumption (Essiz et al., 2023). This value-action gap "reveals a critical lacuna in policies for changing patterns and forms of final consumption" (McMeekin & Southerton, 2012, p. 349).

The value-action gap also applies in the case of Australian environmental policy, which heavily relies on attitudes to change behaviour (Cooper et al., 2016; Halkier & Jensen, 2011). Knussen and Youle (2008) and Smith et al. (2010) indicate that in order to generate long lasting change of complex behaviours that consist of more than one step or action and are deeply rooted in social processes, lifestyle change is required. Waste education building on the linear ABC construct, such as in Australia, deeply underestimates the extent to which individuals' autonomous actions are embedded in daily routines, social situations, and practice (Gorman-Murray & Lane, 2012; Jones et al., 2011; McMeekin & Southerton, 2012; Shove, 2010). However, the ABC model continues to dominate not only in recycling but many areas of environmental education[19], as it is considered logical to think that social order emerges from the accumulation of many conscious daily decisions about how to act accordingly

[19] Contemporary SPT research indicates that the ABC model dominates in a range of areas, for example, climate change campaigns (Kollmuss & Agyeman, 2002; Shove, 2010b), green consumption (Gonzalez-Arcos et al., 2021), travel mode shift (Spotswood et al., 2015), and land clearing, degradation, or loss of biodiversity (Cousins, 2005).

(Kollmuss & Agyeman, 2002). This points to a need for more research in Australia (and internationally) to explore how to reconfigure the approach to household recycling behaviour. This thesis addresses this need in the Australian context.

3.2.2 Norm-Oriented Theories

Norm-oriented theories are based on the assumption that changing social determinants (such as social or moral norms) that guide individual opinions can motivate and direct behaviour (Cialdini et al., 1991). The approach embraces the idea that social systems and structures determine collective norms to a significant degree (Spotswood et al., 2015). In this sense, individual behavioural change can be achieved on a macro-level through a change of structures, for example at the household domain, work environment, or transport services (Reckwitz, 2002). This thesis argues that norm-oriented theories, as part of the family of social theories, can "change behaviour for environmental sustainability in the home" (Breadsell et al., 2019, p. 2).

Tankard and Paluck (2016) investigate normative perceptions in communities in the context of recycling, finding three factors that influence the motivation to follow the norm to recycle. The first factor is the subjective perception of recycling by other (peer) community members in public, creating "the belief that other households sorted their packaging waste" (Miliute-Plepiene et al., 2016, p. 49). This view is based on the understanding that people are "motivated to understand what is normative in the communities to which they belong" and act accordingly to circumvent social rejection (Tankard & Paluck, 2016, p. 183). In this sense, in contrast to intervention strategies based on purpose-oriented theories, norm-oriented theories do not favour how individuals think about their own behaviour, but rather, what is expected by the community and how others would feel about one's individual behaviour, e.g., "recycling is really common in my town" or "the majority of people in my town love recycling" (Tankard & Paluck, 2016, p. 183). The second factor that can strengthen recycling norms is the public commendation of a community's good behaviour by an authority, for example through mass media. Thirdly, norms can be developed or enhanced through the use of institutional signals, such as decisions to prescribe social norms

through mandatory schemes or the introduction of innovations or infrastructure to remove structural barriers (Tankard & Paluck, 2016).

In general, institutional signals that include sustainable interventions or the removal of structural barriers can be linked to environmentalism, often entailing policy changes within wider systems to create more sustainable collective social norms (Wiltshire et al., 2019). In the context of the household domain, recycling initiatives can be linked to ‘private-sphere environmentalism’ by addressing “household waste disposal and 'green' consumerism” (Stern, 2000, p. 409). Stern (2000, p. 413) utilises VBN theory to identify three sub-classes of environmental choices to account for private-sphere behaviours, noting that “personal moral norms are the main basis for individuals’ general predispositions to pro environmental action”. His distinction of the three sub-classes is based on the frequency of environmental choices and their environmental impact. For example, buying an electric car (sub-class one) is an infrequent choice compared to deciding whether to buy products made from recycled plastic (sub-class three). Clustering private-sphere behaviours in this sense is useful as it shows they have different determinants. In the context of recycling, the one-off single choice (e.g., making use of a recycling scheme) may have much less environmental impact than the choice of buying an electric car does over time. However, the high frequency of behaviours associated with Stern’s sub-class three aggregated across a country’s population denotes particular importance in the context of environmental outcomes. Although arguing that environmental moral norms are a strong indicator for pro-environmental behaviour, Stern (2000, p. 414) also argues there is no single indicator in predicting behaviour and that many opposing values such as “self-enhancement or egoistic values and 'traditional' values such as obedience, self-discipline, and family security are negatively associated with pro-environmental norms and action in some studies”. Therefore, in the context of recycling, this thesis argues that there is a need to explore other theories to better understand indicators for underperforming behaviours.

This thesis explores two recently introduced Australian EPR schemes (ARL and CDS) that impose institutional signals to address household waste disposal and have the potential to build new norms. These initiatives offer communities the opportunity to collectively take more ownership of their waste behaviours and generate cleaner

material streams. In the context of newly introduced recycling schemes, Miliute-Plepiene et al. (2016) draw attention to the importance of shaping new social norms in the early stages of implementation. Therefore, it is essential to address social norms early on when schemes such as the Australasian Recycling Label (ARL) and Container Deposit Scheme (CDS) are introduced. Both Australian schemes have been promoted through extensive media campaigns; however, it is uncertain how successfully they have built new norms around recycling. Due to the ongoing underperforming recycling outcomes, it can only be assumed that so far, they have largely failed to build new community norms. To the best of the author's knowledge, there is no research on the effect of Australian EPR schemes on local norm building. The topic is further discussed in Chapters 5 to 7.

The above two subsections demonstrate that although purpose-oriented and norm-oriented theories are widely applied to improve behaviour such as recycling and show a measure of validity to change behaviours in certain situations (Pollard et al., 1999), the dualistic approach has limitations. Structures and individuals are interrelated and neither of them can solely explain the habitual behaviours into which societies are locked (Shove, 2010). Hence the outcomes of the two prominent classical modern social theories, namely purpose-oriented and norm-oriented theories, are criticised for their limited effects on large scale social change (Hargreaves, 2011). Moving beyond the idea of individual attitudes and social norms, the third category of social theories, namely cultural theory, forms an alternative to achieve societal change (Watson et al., 2020). The following section considers one form of cultural theory that re-conceptualises recycling as a social practice.

3.2.3 Cultural Theory

Cultural theories recognise the importance of unreflective routines, practices, and surrounded materiality (Shove et al., 2012; Watson et al., 2020). Social practice theory (SPT) is a branch of cultural theory that aims to target behavioural change by illuminating profound complexities in daily practices (Røpke, 2009). Reckwitz (2002) identifies that the distinguishing characteristic of SPT vis-à-vis other cultural theories (mentalism, textualism, and intersubjectivism) is the adoption of practice as the central

unit of analysis. This is a useful analytical lens that is fundamentally different to the major social theories of behaviour change; as such, it may avoid their pitfalls (Spaargaren, 2011). As described above, the basis of action for traditional social theories is that behaviours are outcomes of external influences leading to individual choice and as such to a certain behaviour. In this view, the individual is the driver of their own behaviour. Contrary to this view, SPT holds that during routinised actions, individuals are not at the centre of their decisions but simply the carrier of competencies and meanings shaping their practices. In other words, a practice is a subconscious repetitive action over which — at the point of emergence — an individual has no control (Shove et al., 2012). Therefore, the analytical focus of SPT is based on non-actor, non-norm variances of the theoretical gaze.

Prior to drilling deeper into the theoretical stances of SPT and drawing upon the advantages of applying this theoretical lens to environmental studies, it is important to understand at what point recycling becomes a practice. Aligning with the definition of waste sorting and separation in Chapter 1, academic researchers describe the core activity of recycling as a form of at-home waste sorting, also known as waste classification, separation or waste segregation (Xu et al., 2017). In the Australian context this also aligns with the definition of the Australian Environmental Protection Authority NSW, in that recycling is described as an activity starting at home with residents involved in the consumption of products and the disposal of their packaging (EPA NSW, 2022a). Both household kerbside recycling and recycling through CDSs begin with the act of manually sorting and separating particular types of recyclable materials into respective receptacles to be collected through or returned within the wider recycling systems. This act aligns with the definition of practices by Shove (2012), as it can be viewed as a constant, omnipresent, and recognisable practice mostly executed subconsciously and habitually. This means that if practiced within a household domain, recycling is most likely recurrently and faithfully reproduced within a relatively stable and unchanging environment. This performance is likely to be integrated into other daily consumption practices such as cooking or cleaning, forming part of an entity transcending moments of performance linked to other practices, seeking a greater objective (Halkier & Jensen, 2011; Macrorie et al., 2015a). Therefore, this research aligns with other international research such as Müller and

Süßbauer (2022) wherein the performances of waste disposal and recycling in the household kitchen are tightly interlocked with the temporal patterns of food consumption (e.g., daily cooking practices) and the linear consumption process. As part of wider systems of food consumption, recycling practices may not always be a deliberate activity but a subconscious consequence of maintaining shared practices such as cooking and cleaning. In their study of resource consumption in Australian homes, Breadsell et al. (2019) find that energy consumption (such as during preparing food) peaks between 5pm and 9pm. Therefore, in the context of the problem of underperforming household kerbside practices in Australia, it is likely that deficits occur predominantly during such peak energy demand hours. Despite appearing only small and locally situated, recycling can involve a significant pattern of elements, actors, places, and processes (including industrial supply chains) (Bissmont, 2020b; He et al., 2019). From this perspective, the analysis of recycling practices through a SPT lens is defensible.

3.3 Social Practice Theory

Moving beyond the rather narrow view of purpose-oriented and norm-oriented theories, SPT acknowledges structure and agency (Spotswood et al., 2017), but it rejects the idea that either individuals or structures are solely responsible (and can therefore be solely accountable) for behaviour (Maller, 2012). Therefore, SPT provides a bridge between individuals and social structures by acknowledging that they are interrelated (Spotswood et al., 2017). Conceptualising a relationship between structures and actors leads to the distinct view that the world is populated by social practices enacted by individuals with limited autonomy in making individual choices in the context of social structural change (Spotswood et al., 2017). While behaviours and practices might easily be confused, contemporary SPT makes a clear demarcation between them. Where behaviours are unique actions involving thought, practices are routinised actions often happening in the subconscious mind (Reckwitz, 2002). This view consequently overcomes the analytical limits of purpose-oriented and norm-oriented theories (Reckwitz, 2002; Shove et al., 2007) by taking daily practices as the central unit of analysis (Strengers & Maller, 2015). This section explores the origin of SPT (Section 3.3.1) and provides an overview of contemporary SPT (Section 3.3.2).

Section 3.3.3 discusses the consumption research literature and outlines the practice-framework applied in this thesis.

3.3.1 The Origin of SPT

SPT is concerned with understanding the social world through the practices embedded therein (Bulkeley et al., 2015). The theory initially developed in the twentieth century from the work of thinkers from various fields including philosophy (Dreyfus, 1991; Heidegger, 1978; Taylor, 1985; Wittgenstein, 1985), sociology (Bourdieu, 1977, 1990; Giddens, 1979, 1984), and cultural theory (Foucault, 1976, 1980; Lyotard, 1984, 1988). All of these thinkers shared an interest in everyday practices and how to explain them. However, considering their diverse perspectives and genres, as might be expected there is no unified practice approach emerging from any of the above fields (Halkier & Jensen, 2011; Schatzki et al., 2001; Schatzki, 2018). However, despite the variety of working versions there are enough points of reference to represent SPT as a loose but definable movement of thought (Nicolini & Monteiro, 2016; Røpke, 2009) which has impacted many disciplines and strands (Watson, 2012). This thesis adopts a sociologically driven SPT lens.

The basic tenet of SPT in sociology is underpinned by two influential concepts. Firstly, the concept of the 'habitus' or practical sensibility, which is defined as a form of blueprint that determines our predispositions for certain actions in a social milieu (Bourdieu, 1977, 1984). Secondly, the concept of 'practical consciousness', which determines routinely performed behaviours (Giddens, 1984). Both concepts build the foundation for contemporary SPT, although they diverge on the range of activities that these practices encompass.

The Habitus: Bourdieu (1977, 1984) contends that individuals are objectively positioned within many fields of life (such as social class, religion, nationality, ethnicity, education, and profession) and that these fields determine the practices we perform. Similarly, fields can be positioned in different social milieus offering different opportunities due to varying access to key resources, e.g., material wealth (economic capital), knowledge and know-how (cultural capital), and access to networks (social capital). Due to this varying access, Bourdieu speaks of existing dispositions within

social milieus and fields, describing them as the actors' ‘sense of the game’, determining all human activity. This is what we know today as ‘the habitus’. Habitus symbolises the foundation of judgment of appropriate tastes, aspirations, or consumption for which practices are a recursively constituted aid (Crossley, 2013) — a sort of practical sense to conceptualise habitus (Schatzki et al., 2001) often formed during childhood (Gram-Hanssen, 2010). Due to varying dispositions between social milieus, the understanding of practices in the context of appropriate performance and required objects can be very different. However, within a single social milieu such understandings are often very similar and contagious (Bourdieu, 1990).

The habitus delivered important groundwork for SPT in terms of understanding varying dispositions and tastes in different fields expressed through the reproduction of social structures or practices (Crossley, 2013). However, Bourdieu never settled on a final definition of the term. Other theorists including Husserl (1973, 1990), Adorno (1976), Mauss (1979), Elias (1996), Weber (2004), and Deleuze (2004) agree with the fundamental concept of ‘the social distribution of taste’ expressed through practices while expanding it to their own working version of the habitus[20]. The different working versions of the habitus diffused the definition of practice into multiple directions. The next paragraph discusses Giddens' (1984) definition of practice in the context of SPT, which offers one of the possibly clearest definitions of how the concept has risen above the traditional actor and structure dualism (Schatzki et al., 2001).

Practical consciousness: Giddens (1984) offers a clear definition of SPT by describing a concept in which social practices become the connective tissue between human activity and the social structures that shape it. This approach has risen above the traditional actor and structure dualism as a new way to conceptualise stability and explain change. Giddens claims that where activity reproduces structure, at the same time, structures shape human activity that are reproduced through them. These flows

[20] It is important to acknowledge that many theorists have built and expanded on Bourdieu’s work. However, due to the scope of this thesis, not every working version of the habitus can be discussed in this section.

are neither conscious or intentional activities chosen by human beings, nor activities enforced by the social structures shaping them. These flows are composed of largely routinised subconscious social practices guided by and making social systems. In this sense human activity and social structure are not two independent things. They are interwoven and shape each other through practice developing across time and space. Their outcomes are social systems formed by social practices being produced and reproduced across time and space with individuals continuously creating routines of practices and relations. Thus, social systems are organised as continuous practices that are performed and transformed by the human beings they comprise (Schatzki et al., 2001). Many practice theorists follow Giddens' conception (Crossley, 2013). They confirm his definition of the reliance of actions on embodied skills, know-how, and understandings. Giddens' work offers valuable insights into the dynamics between agency and social structure (Maller, 2012). However, it was through the efforts of philosopher Schatzki (Schatzki, 1996; Schatzki et al., 2001) and other second-generation practice theorists such as Reckwitz (2002b), Warde (2005), Shove et al., (2012), and Røpke (2009) that the theory gained new momentum in the early twenty-first century, leading to what is today referred to as contemporary SPT.

3.3.2 Contemporary SPT

Contemporary SPT encompasses several different theoretical stances, interpretations, and readings building on the theoretical contributions of Bourdieu (1977, 1984) and Giddens (1984). All contemporary SPT stances view practices as the smallest unit of social action, and as recursive, with structure and action co-constitutive of one another (Schatzki, 2002). This means desired changes in human behaviour are not the result of one's individual choice, structures or social norms but change in practices (Watson, 2012). Thus, the conception of society and social change within contemporary SPT makes a cut through the dualistic approach, focusing on practices (Hargreaves, 2011). Most practice theorists conceptualise practices as being comprised of elements and carried out by many people and not one person alone (Schatzki, 2018). Schatzki (2002, p. 73) defines practice as 'a set of doings and sayings' that are constituted by elements of practice as they link observable actions (Schatzki, 1996). However, in SPT there is no single universally valid classification of practice elements that configure a practice. A range of elements generally cited can

be singled out from the forest of contending approaches, including cultural conventions and representations, material objects, normative understandings of competent performance, social and economic institutions, and spatial and temporal organisation (Reckwitz, 2002b; Schatzki, 2002; Shove & Pantzar, 2005; Southerton, 2006; Warde, 2005).

The constitution of practice in contemporary SPT highlights its collective aspects (Bartiaux et al., 2014), originating from Giddens' (1984) theory of structuration and Bourdieu's (1972, 1980) notion of collective habitus or homology. Diverging from the work of Bourdieu and Giddens, contemporary SPT features materiality (Shove et al., 2012). Prior to the 1980s, materiality was separated from the rather intellectual genre of traditional social science. Mundane items were not regarded as part of the process of social reproduction and therefore did not attract social scientific interest. The common tendency among social science scholars was to prioritise the mind, signs, and symbols rather than 'things' and to analyse behaviours or personal relationships directly (Preda, 1999). This stance changed with the work of theorists such as Latour (1992) and others recognising the central role of materiality in social and technical systems[21] and the status of things in generating daily life (Trentmann, 2009). In contemporary SPT most theorists embrace the turn to materiality, agreeing that human actions intersect with material elements (Schatzki et al., 2001). Concomitantly, SPT holds that we cannot analyse the social world without developing an understanding of the behaviour and nature of materiality such as technologies and artefacts and the impact they have on shaping our lives. Shove et al. (2007, p. 46) suggest that "ordinary objects are extraordinarily important in sustaining and transforming the details and the design of everyday life". Accordingly, it is argued that many new practices spring from developing socio-technical systems as they evoke new demands, alleviation, or obligations (Biijker, 1997).

[21] When systems and technology co-develop, the term sociotechnical system is used, which exemplifies the influence technologies have on the negotiation and development of social order and everyday life (Latour, 1992).

Over the past quarter of a century, an abundance of work from SPT theorists has contributed to the design of a more coherent approach to analyse practices, generating a better understanding of the constitution and change of practices (Røpke, 2009; Shove, 2010, 2012). Schatzki et al. (2001) were the first to make the distinction that practice consists of two dimensions, namely the single activity it contains (practices-as-performance) and the organisation of single activities that can be connected to an overarching entity determining moments of everyday life (practices-as-entity), a concept further used in many SPT studies (Shove et al., 2007; Shove, 2010; Spurling & Mcmeekin, 2015; Warde, 2005). Shove and colleagues were the first theorists to refer to such entities as 'bundles' of connected activities that link in a logical way (Shove & Walker, 2014; Shove et al., 2012). This approach is a revolutionary turn from the original theory approach where practice elements such as know-how, meanings or understandings were seen as individual attributes. Now, by extension, SPT holds that human lives consist of and hang together through connecting bundles of practices of which humans are the carriers (Schatzki, 2002; Shove et al., 2012). While this concept is gaining attention, until recently, studies have predominantly been concerned with isolated practices. In the main, this can be explained on the basis that the initial step for researchers has been to look into questions about how single practices interact within larger systems (Graham, 2018). Only recent work of theorists such as Kuijer (2014) and Higginson et al. (2015, 2016) has attempted to create theoretical models to diagrammatically represent a network system of practice, discussed in more detail later in this chapter.

Although few studies attempt to model linking practices, there is a growing understanding that such bundles (or entities) can connect to larger constellations or nexus of practices. Schatzki (2015) asserts that a nexus of practices can form a plenum — an immense constellation of linked bundles of practices and things — describing social phenomena as pieces of such plenum. Watson (2012, p. 488) suggests that interconnected practices "are partly constituted by the socio-technical systems of which they are a part" and in which practice change shapes the system and vice versa. This view aligns with other theorists such as Røpke (2009) who suggests that bundles of practices shape and can be shaped by the "wider political, economic, legal, and cultural structures" (Maller, 2012, p. 2) in which they are

embedded. However, according to Schatzki (2015), at the origin of each plenum or system will always be practice and materiality. Following this conception is an understanding that central to the change of social life are the dynamics of bundles of practice and arrangements, their emergence, maintenance, and disappearance. Practices are ever-changing. Big change arises from small changes and every activity can potentially be a new beginning. In this sense Schatzki et al. (2001) align with Bennett (2010) and Connolly (2011) in that society is an ever-developing pattern of continuity and change with practice and things being contingent, their relations manifold, and where development is unequal but constant (Strengers & Maller, 2015). Before delving deeper into the theoretical framework of this research, it is useful to explore the application of SPT in the context of environmental issues.

3.3.3 SPT in Consumption Research

This section explores the application of SPT in consumption research at the household domain in the context of the contemporary 'practice turn' (Hampton & Adams, 2018, p. 1). To the best of the author's knowledge, SPT has not yet been applied as a theoretical lens to the practice of recycling municipal consumer packaging. However, SPT has been widely applied in the context of consumption studies due to the interconnected nature of recycling with other consumption practices. Practice-based consumption studies typically aim to improve understanding of environmental challenges at the level of the family and the household (Bartiaux et al., 2014; Gram-Hanssen, 2011; Mylan & Southerton, 2018; Sahakian, 2022). To this end, practice-based consumption studies seek to overcome the structure-agency dichotomy (Sahakian et al., 2021). A review of practice-based studies in consumption points to a growing body of literature, starting with the research of Warde (2005) and Røpke (2009). Their work brings a practice perspective to the study of the complexity of systems of consumption in everyday life. Warde (2005, p. 145-146) states that "consumption occurs within and for the sake of practices" and that "practices are internally differentiated such that persons in different situations do the same activity differently". In the recycling context, the same practice can occur in different situations, such as when individuals are cooking, cleaning, or storing things and might vary depending on the location (kitchen, bathroom, or storage room). This thesis focuses on recycling practices in the realm of the kitchen as the majority of MSW waste is

kitchen waste (An et al., 2014). Within his practice-based consumption research, Røpke (2009, p. 2496) promotes a “co-evolutionary approach, taking into account how domestic practices co-develop with changes in production technologies, supply chains, transport infrastructure, exchange institutions, retail systems etc". In this manner, it is anticipated that Australian household recycling practices will co-develop with the newly introduced federal target to make 100% of all consumer packaging reusable, compostable or recyclable by 2025 (Australian Government, 2019). This target can be viewed as an adjustment to the socio-technical systems and is likely to play a role in recycling practice development.

The majority of practice-based consumption studies focus on activities related to at-home energy consumption[22] such as laundry (Mylan & Southerton, 2018) or shifting to more sustainable forms of transport (Spotswood et al., 2015) to reduce resource consumption (Breadsell et al., 2019). According to Stern (2000, p. 409), these activities comprise the second sub-class of environmentally significant private-sphere behaviours, including “the use and maintenance of environmentally important goods (e.g., home heating and cooling systems)”. The prominent focus on this sub-category in practice-based consumption studies began with the pathbreaking work of Elizabeth Shove (Shove, 2003), underlining the notion that introducing isolated green policies, technologies or morals alone do not lead to significant change.

In the context of recycling, which is part of sub-category three of environmentally significant behaviours within the private-sphere, namely green consumption and waste disposal (Stern, 2000), it can also be assumed that to achieve significant changes more practice-related research is required. However, practice-based studies in this category are sparse and indeed do not exist for the at-home recycling of yellow bin materials. The few studies in the context of green consumption and disposal address consumer resistance to sustainable consumption interventions (Gonzalez-Arcos et al.,

[22] Energy consumption studies have been a focus of research since the 1970s. However, in the past they were mostly driven by applying socio-psychological approaches to discover ideal behaviour change methods (Delmas et al., 2013).

2021), disposing of food waste (Evans, 2012) or waste avoidance studies in the context of single-use packaging (Müller & Süßbauer, 2022) and the minimisation of general household waste (Bissmont, 2020b).

When it comes to the investigation of the second and third sub-classes of environmentally significant private-sphere behaviours, the concept of practice-as-performance and practice-as-entity apply most frequently within the field of practice-based consumption research (see Section 3.3.2). Firstly, in the context of consumption practices, this concept has merit as it shows that they are being sustained by collectively shared elements such as bodily habits, technology, know-how, rules and principles, engagement, and morals. Secondly, by extension, aligning with the work of Schatzki and Shove as described above, the practice-as-entity concept implies that consumption practices should not be viewed as standalone practices but as part of different bundles of practices that are related to each other both horizontally (as part of a flow of practices) or vertically (as parallel practices).

Accordingly, many consumption practice researchers agree that in order to understand consumption practices, it is essential not to empirically apply SPT in the context of one single practice. For example, Warde (2005), Shove and Pantzar (2005), and Klitkou et al. (2022) stress that an understanding of intertwining and interacting practices offers opportunities to better understand how to change specific unsustainable consumption related behaviours. Watson et al. (2020) reveal the interconnectedness of the use of energy and water with daily practices of food consumption. The authors suggest that resource reduction could be promoted through a change of other household practices, small or big, such as changes in housing type, food, waste or transport practices, pointing to the interconnected nature of consumer practices. In the context of household recycling and its interconnective nature within the wider range of consumption practices, focus lies on the entanglement with food practices (e.g., planning, purchasing, storing, cooking, serving, and eating) linked through integral shared elements (such as disposable packaging) that directly or indirectly influence each other (Borrello et al., 2020). Figure 3.2 visualises the potential positioning of household waste, recycling, and CDS practices within the wider system of

consumption in which they are embedded. The inner circle of the figure shows the interconnectedness of waste and recycling as practice-as-performances that are surrounded by other entities of consumption practice. The inner circle includes FOGO as a further recycling option next to yellow bins and CDS in line with federal government recommendations for additional source separation in metropolitan areas as a regular component within the standard kerbside system.

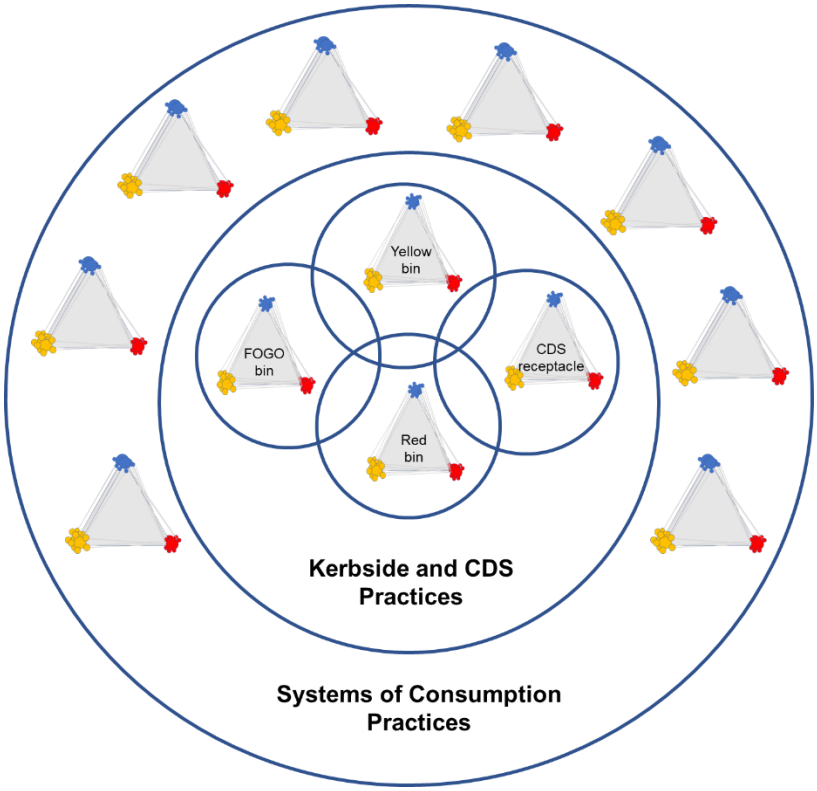


Figure 3.2: Kerbside and CDS Practices Within the Wider Systems of Consumption Practices.

In their investigation of the connection of the wider system of household consumption practices, Müller et al. (2022, p. 303) identify disposable plastic packaging as an "integral material element of food consumption". Although integral, Murcott (2019) and Watson et al. (2020) observe that most people handle packaging — from purchase to disposal — as an object that is "completely ordinary, unremarkable, and barely noticed" (Murcott, 2019, p. 98). These arguments show the connectedness of practices through their connecting elements, here packaging, lending support to Borello's (2020, p. 3) assertion that the broader systems of consumption practices are

integral and thus need to be considered in the context of recycling as it is part of “a sequence of actions ending with getting rid of things”. The literature largely views recycling as being the end of a linear process of consumption routines, such as shopping, storing, meal preparation, and eating (Bissmont, 2020a; Evans, 2012; Müller et al., 2022; Wonneck & Hobson, 2017). By extension, there is likely to be an upstream impact flow between the beginning and end of food consumption practices and vice versa (Roodhuyzen et al., 2017). This thesis aligns with the accepted view of recycling being the end of a linear process, supporting the argument of an impact flow. However, following Bourdieu, varying social milieus might provide different dispositions that impact the organisation of the flow of food consumption practices. Therefore, Figure 3.2 is not organised as a flow chart.

To highlight the significance of this research it should be repeated that although the stream of consumption practice research is delivering new insights, including the notion that the change of one consumption practice could be provoked by changing other interconnected practices (Watson et al., 2020), most behaviour change models applied to change consumption practices generally try to influence individual choices directly, failing to address a large-scale set of interconnected practices (Shove et al., 2012; Shove & Walker, 2014). In the context of household recycling, the literature demonstrates that it is interconnected with other consumption practices. The above selection of studies concerned with the exploration of consumption practices through an SPT lens demonstrate the value of a practice-based approach. However, such studies do not directly focus on yellow bin recycling or recycling through a CDS. To the best of the author’s knowledge, there is a dearth of SPT studies offering valuable motives for household kerbside recycling and participation in CDSs from a practice perspective, indicating a gap in the literature. This gap justifies investigating, through a practice lens, how household kerbside practices are conceptualised and promoted and how the introduction of CDSs contributes to the enhancement of recycling practices.

3.4 The Shovian Practice Model

This thesis draws upon the analytical translation of the Shovian practice model by Shove and Pantzar (2005), Shove et al. (2007), and Shove et al. (2012), applying it to the empirical study of household recycling practice. In the range of useful SPT frameworks, the Shovian model is the most commonly applied and cited approach in the context of understanding what is required to achieve behaviour change (Higginson et al., 2015). Over the years of contemporary practice research, the Shovian model developed while conducting practice-related research focusing on the consumption of energy, commodities, sport, and lifestyle (Shove et al., 2012; Warde, 2005), and as outlined above, has become an important guide for many SPT related studies. This is due to the model's ability to incorporate significant contemporary stances of SPT into one clear model. For example, the framework is based on more complex versions of the theoretical work of Schatzki (1996) and Reckwitz (2002). Where the work of Reckwitz (2002) focuses more on the constituent elements of a practice, including an elevated status of materiality, Schatzki's (1996) focus lies on the connections between the elements and practices. Shove (2012) builds on the main pillars of both complex versions but reduces practice elements to a 'simplified, lean, slim-line' version including 'meaning', 'competence', and 'material' as shown in Figure 3.3 (Shove et al., 2012, pp. 22–25), to make the model applicable for policy consumption (Spotswood et al., 2015).

Each element can inform how to analyse daily practices and provide consistency amid the reproduction of practices. Although practice elements do not always have clear boundaries in relation to each other (Røpke 2009), the model provides a powerful framework to discover linkages of practice, reproduction patterns, core and marginal elements, and potential footholds for practice change (Hargreaves, 2011; Shove et al., 2012). The Shovian concept also acknowledges: i) the central role of agency without making it the primary unit of analysis (Hampton, 2018); ii) the complexities underlying the performance of a practice; iii) the incorporation of new practice elements into existing practices; and iv) how daily routines can change over time. It also considers the connections between 'bundles of practices', a term developed by Shove and colleagues to express the interconnection between single practices, together determining moments of everyday life.

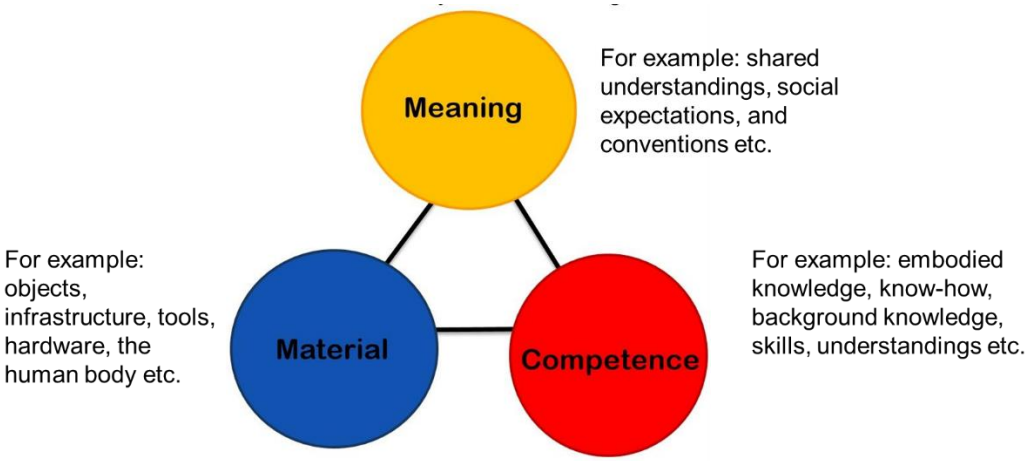


Figure 3.3**: The Three Elements of the Shovian Practice Model.** Source: Shove et al. (2007) and Shove et al. (2012, p. 14).

The following subsections examine each element of the Shovian model to describe the life of a practice, including material (Section 3.4.1), meaning (Section 3.4.2), and competence (Section 3.4.3). Next, the concepts of practice-as-performance (Section 3.4.4) and practice-as-entity (Section 3.4.5) are explored, followed by a discussion regarding the recruitment of practitioners (Section 3.4.6). Each of these subsections draw connections to recycling practices relevant to this research.

3.4.1 Material

Contemporary practice theorists assign an elevated status to material, equally powerful as ‘meaning’ and ‘competence’ (Shove et al., 2012). Shove et al. (2007) feature ‘material’ as an arrangement of practice that is not only semiotically communicative, for example by being representations of symbolic meaning (Warde, 2005), personal status or identity (Shove & Pantzar, 2005), but also practically useful and “directly implicated in the conduct and reproduction of daily life” (Shove & Pantzar, 2005, p. 44). For example, a yellow lidded recycling bin is semiotically communicative by representing the identity of practicing and valuing recycling and in so doing showcases that agency and society appear and are distributed through the interactions between humans and materiality (Shove et al., 2007). At the same time, the ordinary bin is practically useful by assisting to capture the large amount of

recyclable material a household produces during a week. Thus society and materiality are not two separate realms but rather are interwoven (Müller & Süßbauer, 2022).

While integrated materials can embrace “objects, infrastructure, tools, hardware and the human body itself” (Jütter, 2017, p. 6), they are part of our environment within existing social and technical systems (Shove & Pantzar, 2005). They are furthermore an important part of ‘normalising practices’ as they generate and sustain opportunities for repetitive performance that can make ‘faithful practitioners’, which in turn can spread practices (Shove, 2003, p. 411). Higginson et al (2015, p. 962) suggest that each practice includes central elements to perform and normalise it, which they call ‘core elements’. To call material elements 'core elements' does not require a high level of technicality. In the context of the materiality that surrounds us when performing in-home consumption practices, Shove et al. (2007) note that our chosen kitchen setup reflects many of those everyday practices being produced by, through, and around individual chosen objects, which may or may not be technical. Thus Shove et al. (2007) confirm that the simple intricacies of appropriate in-home infrastructure are crucial for waste separation as well as generation.

Another crucial core materiality that impacts the practice of separating waste and recyclables is multi-component packaging (Knickmeyer, 2019). As shown through initiatives such as the ARL, Australian packaging is now multi-component. Furthermore, an emergent innovation to make 100% of all consumer packaging reusable, compostable or recyclable by 2025 (Australian Government, 2019) may impact on packaging design to make *new materiality* emerge. This demonstrates how regulations in packaging (such as adding labels or changing materiality) may either contribute or interrupt continuous performances by making new and breaking old practices (Shove, 2004; Shove et al., 2012). As such an adjustment to the socio-technical systems can play a key role in practice development. At first glance the re-design of packaging — making it 100% sustainable — can positively impact underperforming recycling practices. However, according to Shove et al. (2012), accessible materials have no value on their own. It is only when material is connected to competence and meaning that a new practice can emerge (Shove & Pantzar, 2005).

As mentioned above, the ARL provides guidance to consumers on how to correctly separate complex packaging components. This label on multi-component packaging to build better recycling competences could enhance underperforming recycling practices in Australian homes. However, as outlined by Gorman-Murray and Lane (2012, p. 5), without "consider(ing) realistic options for transformations in cultural practices […] government initiatives to promote ecological modernisation run the risk of simply green-washing the very economies of consumption that currently drive unsustainable practices". Therefore, this thesis proposes that in the context of multi-component packaging, the sole addition of a label is insufficient; material changes to make such behaviour more sustainable is required to correct recycling behaviours. To embrace the practice view it is thus important to also address the meaning of separating multi-component packaging, which is addressed in this thesis.

3.4.2 Meaning

Shove et al. (2012) define meaning as shared understandings, social expectations, and conventions to make sense of activities. Accordingly, meaning is specifically directed towards a behaviour or a thing and closely relates to Bourdieu's (1984) concept of the habitus, wherein: (i) understandings about the significance of symbolic meanings, ideas or aspirations are shared amongst communities, and thus hold people together; and (ii) the foundation of habitus — the judgment of appropriate tastes, aspirations, or consumption for which practices are a recursively constituted aid (Crossley, 2013) — can have its genesis in the education of children (Gram-Hanssen, 2010).

Meaning is the most volatile element in the 3-element model (Shove et al., 2012) as it can be present across a vast segment of the population and circulate rapidly. Meaning can also be substituted. This does not mean that historical meanings are of no significance. However, they can change quickly, especially within communities, and on a personal, cultural or lifestyle level. For example, in the context of recycling, Oliver et al. (2019) suggest that an individual with a strong positive attitude towards recycling at home, may abandon the practice when on vacation, for example due to the prioritisation of relaxation. This example shows that the movement of people within

and between social environments might influence the distribution of practices through the introduction or prioritisation of new or different expressions of meaning.

Stakeholders such as governments, industries, or social organisations can attempt to prescribe existing meaning, for example through planned interventions (Tankard & Paluck, 2016). This can be underpinned by effective public social discourse to shape meaning and ultimately act as a social force to change practice. It should be noted that people generally do not modify their actions at the level of meaning if that meaning is not widely shared (Shove et al., 2012). If a promoted practice is not performed by other people, individuals might conclude that the world is a place where this practice does not belong (Spotswood et al., 2015). Therefore, looking at what others do is a predisposition that reflects an in-built sense of what behaviours are right or wrong for us (Rettie et al., 2012). However, even where a shared meaning is commonly accepted in a community, leading to normalising a practice (Shove, 2003), the individual always needs the right competence and materiality to activate the same performance (Shove et al., 2012).

3.4.3 Competence

Competence comprises ‘‘multiple forms of understanding and knowledgeability’’ (Shove et al., 2012, p. 23) and refers to embodied knowledge, know-how, background knowledge, skills, and understandings. This definition originates in the work of Bourdieu (1986) and Shilling (1991). The competence element builds on individual knowledge, acknowledging the central role of agency without making it the primary unit of analysis (Hampton, 2018). Competence can be acquired by learning, either consciously (e.g., by dedicated specific training) or subconsciously (e.g., through mimicking) (Shove et al., 2012). The way a competence is acquired is not considered fundamental in SPT research. More important is that the more a practice is repeated the more it binds practitioners and the more likely the practice advances as the competence manifests (Shove et al., 2012).

In the context of improving household kerbside recycling in Australia, the task of LGs is typically to change manifested inefficient recycling practices by building better

competence through information campaigns. This approach aligns with the typical ABC method, where information about environmental issues and other measures taken to promote the right behaviour are offered in a non-personalised way. However, this method has historically yielded limited success.

Figure 3.4 illustrates the elements of the Shovian practice model (Shove et al., 2012) in the context of Australian household kerbside recycling. It should be emphasised that the elements in Figure 3.4 are equally weighted even though the figure appears hierarchical. The examples presented are suggestive of a preliminary theoretical framework around recycling practices. Elements in the context of recycling practices in Australian metropolitan households are the focus of this thesis and will be investigated in more detail in later chapters.

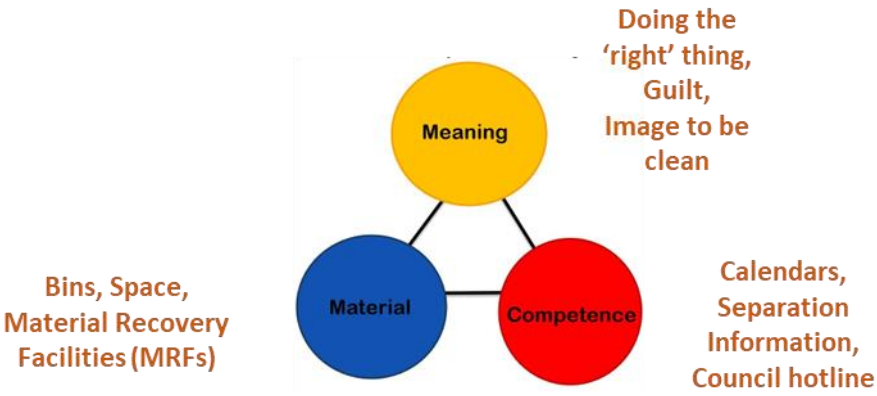


Figure 3.4**: The Three Shovian Practice Model Elements (Shove et al., 2012) in the Context of Household Kerbside Recycling.**

In the context of the theoretical framework of SPT, it should be noted that a practice is sustained through its existing elements that represent an omnipresent reminder of an existing practice. Elements not only link and enable performances such as recycling but also guide the way in which daily life is organised. Therefore, this section illustrates the applicability of the Shovian practice model in the context of household recycling. The next section elaborates on the characteristics of linking and sustaining links between elements of practice to form and reproduce single performances and to link to practice entities, translating into patterns of daily life.

3.4.4 Practice-As-Performance

According to Shove et al. (2012), at least one example associated with each of the three elements must link in order to form a practice. Therefore, the spread of practices is always determined by the distribution of the three elements of practice described above. A practice-as-performance (Schatzki et al., 2001) enacts in specific moments and can be continuously reproduced in the same local environment, producing an emergent outcome (Shove, 2010). This thesis defines the act of manually sorting and separating household recyclables as a practice-as-performance supported by at least one of the three elements, including bins (materials), recycling knowledge (competencies), and pro-environmental attitudes (meanings).

During the reproduction process of a performance, elements can be transformed, showing that the development of a practice never stands still and that it can evolve through its transforming elements. This implies that steadiness and routine are not the outcome of a one-off enactment of a practice but rather defined as an ongoing accomplishment of repetitive linkages of elements of practice. Further, even if a practice accomplishes the repetitive linkage of the same elements consistently, there is not one unique way of performing a practice (Reckwitz, 2002). Every time linkages repeat and a practice re-appears, its execution will vary in subtle ways (Shove et al., 2012). Kuijer (2014, p. 52) proposes that subtle variations of the same practice-as-performance can lead to a variety of element combinations to perform a similar practice-as-performance. This suggests that there is a range of possibilities in which elements can link to perform a similar practice. This concept demonstrates that a practice-as-performance can include manifold variations of heterogenous elements a practitioner can extract from certain “groupings of elements and multitude of links” (Kuijer, 2014, p. 52). Such groupings can form an entity accommodating the various variations of a single performance (Higginson et al., 2015; Higginson et al., 2016).

Figure 3.5 visualises such a practice-as-entity and the break off into two sequential performance variations[23] (Performance 1 and Performance 2).

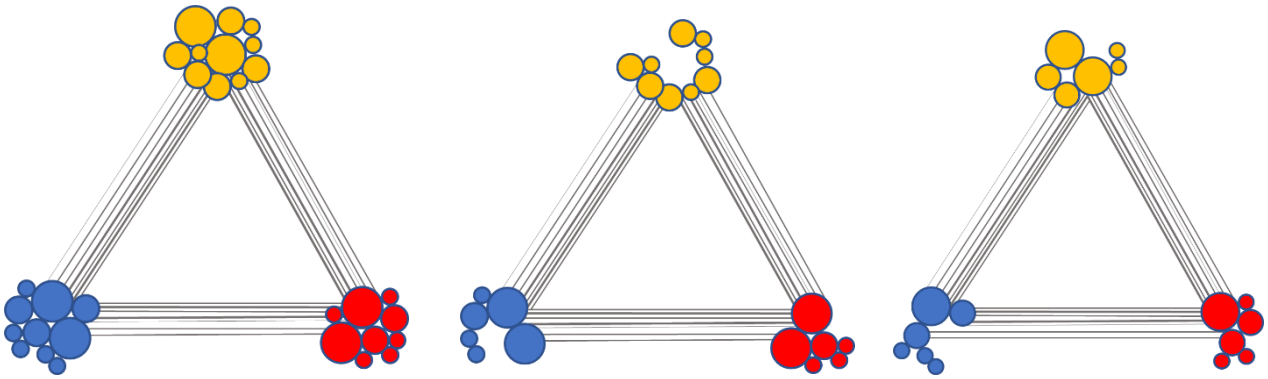


Figure 3.5: Practice Entity Holding Various Performance Elements and Two Exemplified Performance Variations. Based on Kuijer (2014).

The performance variations shown in Figure 3.5 may be attributed to the prominence of elements at different times and/or in different spaces leading to distinct performances depending on surrounding conditions. This suggests that each performance variation of a similar practice represents an in-the-moment decision based on the opportunities arising from the particular grouping of elements included in their entity. By choosing different "combinations of interconnected elements [each performance] can be conceptualised as having different geometries" (Higginson et al., 2015, p. 954). Such geometries can be characterised by the combination of their element types or as Higginson et al. (2015) define it, the combination of core, marginal, and intermediary elements (here shown as large, medium, and small bubbles). Elements in this conception "'core' to the practice [are those] which appear at least once in each variant and are shared by all variants. Marginal elements are 'peripheral'; defined here as those elements which are unique to a single variant (Higginson et al., 2015, p. 962). Higginson et al. also identify a third "intermediary" group of elements

[23] It should be noted that more variations can break off the entity to perform one similar practice-as-performance.

that do not sit within either “core” or “peripheral” — “these elements are shared by some, but not all, variants” (2015, p. 962). Performance 1 and Performance 2 in Figure 3.5 illustrate that element combinations can vary yet also hold similar core and intermediary elements, being part of multiple performance manifestations and simultaneously acting as a form of connecter or tissue (Shove et al., 2012) holding complex social arrangements together (Higginson et al., 2016).

Practice-as-entity and their performance variations can also be visualised in the form of a network map. Higginson et al. (2015) attempt to diagram laundry practices in a simple but distinct form represented by a quantitative data set[24]. This approach has merit in the context of the visualisation and quantification of practice (Hampton, 2018). In the case of laundry, the approach is fairly risk-free as manifestations of the practice are limited. However, Higginson et al. (2015, p. 952) acknowledge some practice dynamics can be “irreducibly complex constructs” that may impose an inevitable degree of complexity where the risk of oversimplification and subsequent misinterpretation should not be underestimated. The current thesis utilises qualitative data collection (detailed in Chapter 4) and does not seek to construct a network map of household kerbside recycling practices. However, the concept of performance variations should be kept in mind, particularly the notion that changing the character of an element (core or intermediary) that is part of an entity can serve to influence multiple practices. In this sense practice elements are not just ingredients of practice, they can also be instruments that coordinate how practices relate and shape each other (Shove et al., 2012). Ultimately, shifts in the characteristics of connecting elements can provide the impetus for change. Understanding change, however, necessitates attention to both single performed practices and their variations as well as multiple related practices connected through their entities (Watson, 2012).

[24] Higginson et al. (2016) expand their research by applying the above concepts to a larger set of quantitative data. The authors visualise complex practice networks via a force atlas to “reveal characteristics like variability or cohesiveness of performances within variants, central and peripheral elements, and similarity and difference between variants” (Higginson et al., 2016, p. 962). The complexity of this approach extends beyond the scope of this thesis.

3.4.5 Practice-As-Entity

Building on the work of Schatzki et al. (2001), practice-as-performance (and their variations) are never performed in isolation; instead, they are linked as they depend on each other (Blue & Spurling, 2017; Hui et al., 2017; Nicolini, 2009; Schatzki, 2016; Shove et al., 2012). Researchers such as Reckwitz (2002) argue that within communities, entities of practices are shared in the sense that most people do them repeatedly, in several different ways, with constant blocks of activities. For example, at-home consumption practices such as laundry "play out in various ways in the course of negotiating the performance of everyday practices" (Mylan & Southerton, 2018, p. 1148). The core performance of household kerbside recycling might be waste separation; however, it also includes the performances of taking out in-the-home bins, dropping their materials into wheelie bins or moving full wheelie bins onto the street for collection, which in a wider sense is the result of food consumption practices. This demonstrates that multiple interconnected practices may restrict, enable, or condition another practice (Shove et al., 2012) and can (but do not have to) link to form entities (Schatzki et al., 2001). Disposable packaging interconnects practices in the context of food consumption, for example regarding food storage, transportation, and preparation (De Fano et al., 2022), and as such forms part of many routines (Bissmont, 2020; Borrello, et al., 2020). Hui et al. (2017, p. 4) use the notion of 'threading through' to capture how packaging moves across practices and, thereby, is a material element that links them. Additionally, as an interconnecting element following the logic of interconnecting practices, it has the potential to become an unintended product of enacting or changing multiple practices (Bissmont, 2020).

In the context of the concept of practice-as-entities it should be mentioned that if multiple practices link, they become characteristically resource-intensive loose or close connections, as outlined below. Such connections can be characterised as recognisable, intelligible, and describable, creating forms of path dependency causing their reproduction within 'emergent and uncontrollable trajectories' (Shove & Walker, 2010, p. 475).

Loosely connected entities: Loose entities are based on their co-location (e.g., storing food and disposing of waste). When forming a loose connection, practices can exist together in any location performed consecutively or simultaneously, but without following an immediate same pursuit, interfering, or depending on each other (i.e., non-dependent). Co-located practices that occur in the same domain can condition each other as they 'co-evolve' (Klitkou et al., 2022), which can form co-dependent connections as proximity most likely causes forms of interaction. Cross-conditioning of co-located practices can occur in many ways and can produce different outcomes: variation, expiration through competition, or transition to close connections (Shove et al., 2012). In his analysis of a PEBC initiative termed 'Environment Champions', Hargreaves (2011) seeks to challenge the enactment of certain low-level sustainable practices in the workplace. The study reveals "surprising links between seemingly unrelated practices" and notes the central role of "the surrounding material infrastructure, legal, social, and power relations" (Hargreaves, 2011, p. 95). As such, Hargreaves (2011) proposes a focus on local environments such as the home or the office, considering the interconnections of co-located practices when trying to achieve PEBC. This thesis focuses on the in-the-home environment in the context of the research problem of underperforming household recycling practices, in particular kitchen areas as kitchen waste comprises a significant portion of MSW generation (An et al., 2014).

Closely connected entities: When forming close connections, practice entities build co-dependencies (such as cooking and cleaning) that can be traced to one higher purpose. In such moments, practices must sequence, coordinate, and hand over actions as a co-dependent entity. The success of building such inter-practice relations is reliant on the effectiveness of sequencing and if required sudden modifications to meet changing conditions. Co-dependencies of close connections can be short or long-term following emergent mutual pursuit. Long-term arrangements of closely connected entities can reflect regular work or other weekly or monthly scheduled events (Shove et al., 2012) that routinely depend on the effective reproduction of practice sequences. However, sequences can be associated with enormous variation (Silverstone, 1993) and can therefore initiate additional workflows that stimulate

connection of further networks of practices, both upstream or downstream (Shove et al., 2012).

The concept of loosely and closely connected practice entities points to the idea of sustaining and changing connections built within practice-entities depending on the repetitive linkage or breakage of their elements, the shape of previous and co-existing practices, and the feedback received between crossing trajectories (Shove et al., 2012). However, since practices are performed at specific times and in specific spaces (Hui, 2017), and in daily life often compete over limited temporal and spatial resources (Røpke 2009; Shove, 2009; Shove et al., 2009) the three elements of material, competence, and meaning are not wholly explanatory in relation to the shaping of practice (Müller & Süßbauer, 2022). Therefore, as proposed by Schatzki (1996) and other contemporary researchers, determinants that shape practice entities, other than their own relationship to each other, are space and time, as practices "are both anchored in and dispersed across [them]" (Breadsell et al., 2019, p. 7). In their review of studies investigating the impact of household conditions on the diversion of MSW from landfill, Briguglio (2016) finds that recycling requires both space and time for separating recyclables. The traditional means of investigating recycling concerned with the transformation of individual values and cultural norms that drive individual behaviours are generally independent of space and time (Breadsell et al., 2019). The following two paragraphs discuss how the motivation to devote space and time to a practice can heavily impact one and other practices, including the marginal costs and benefits in performing one over the other.

Practices and time: The timing of loosely or closely connected practice entities creates routines that are typically heavily influenced by social demands (e.g., eating dinner). Therefore, reoccurring practice entities shape the temporal schedules of our day. In the context of time, connected practices can compete for time, some can be time overlapping, spread out over quite some time, or be performed in synchrony or in sequence. Consequences of such eventualities may involve compromises, often shortening one practice to spend more time on another (termed cross-practice trade-off). However, competing practices can also form some sort of mediating ground

where time is equally shared, which subsequently can strengthen both the practices and the relationship between them, making them reoccur (Shove et al., 2012).

Practice and space: Since space (in the context of this research, residential space) is unequally available to everyone, its availability (or lack thereof) can shape practices, particularly the way they manifest, develop, and change over time. For example, we design places such as our homes based on the practices we want to perform. Although many practices can occur in the same space, each practice requires its own adequate practice-space. Required space determines the opportunities available to favour certain practices over others (Shove et al., 2012). Disposal and recycling practices associated with source separation generally require additional space in the form of receptacles (e.g., bins, bags, and boxes) (Briguglio, 2016, p. 505) that are not always available in every household depending on the 'dwelling size'. Briguglio (2016) notes that household space constraints at multi-unit dwellings lead to a lower recycling rate compared to single-unit houses. This example demonstrates that the performance of recycling relies on the space that is offered for waste separation. The influence of space, both inside and outside the home, on disposal practices (making space and overcoming spaces) is also crucial for the reduction of household waste, as identified in Sweden (Bissmont, 2020a). When referring to the habitus, even if space is available, objects and areas for waste separation can vary (e.g., between same-size dwelling types), as individual arrangements are influenced by personal taste, cultural conventions, social class, economic strength and so on, reflecting varying practices (Shove et al., 2007).

3.4.6 Recruiting Practitioners

The recruitment of practitioners can happen in many ways: through the social class we were born into[25] (Bourdieu, 1984), over social ties, the design of the material world, the law, institutions, etc. The likelihood of becoming a practitioner of certain practices

[25] The local and social environment we were born in forms the starting point for our future practices. They determine the opportunities we have in life and their differences impact our personal development and agency (Bourdieu, 1984).

lies in the significance of participation within the local and social environments people are part of and the ability to access required practice elements[26] (Shove et al., 2012). We are part of many local and social environments: some we belong to and some we choose. The cohesion of a social environment — weak or strong — can determine the obligation people feel to invest energy and efforts into building or reproducing practices promoted by the environment (Shove et al., 2012).

The spread of a new practice often works fastest via viral marketing when people who know each other or have a shared group of interests introduce new practices (Shove et al., 2012; Shove & Pantzar, 2005). Once hooked, new practitioners gain experience and advance by repetitively reproducing the performance of the practice. They become advanced practitioners to a point where the practices they engage with define who they are and which communities they belong to (where practices feel normal and not abstruse). Lave and Wenger (1991) note that novices can have a higher motivation to do things differently and advanced practitioners can be trapped in old routines. On the other hand, Franke and Shah (2003) indicate that there are situations where new tricks or techniques are developed by experienced practitioners, constantly redefining the state of the art of a practice.

The term community of practice embodies an approach to promote knowledge sharing, learning, and change within local, social, and professional environments. For example, in companies with diverse organisational performances, informal communities of practice are set up to capture and spread ideas and build creative ways to approach problems. Wenger (1998) suggests communities in business or social environments that share practices over time, shape each other and the shared practices they are performing. From an educational point of view, this means that it is more effective to shape practices in communities by spreading ideas for change and

[26] Many factors can restrain or expand access to practice elements. Such factors can include financial resources, physical fitness, or access to material or the environment itself. Therefore, different environments can be either enabling or limiting, and therefore determine and shape practice (Shove et al., 2012).

sharing experiences of performing them, than from afar. This accounts for both positive and negative practice experiences. For example, if a practice experience is negative, a measure of community disapproval could dissuade practitioners from undertaking the practice. Negative practice experience can be useful to the extent that it can, in due course, increase competence by indicating what behaviour should be discarded in the future (Watson & Shove, 2008).

This literature review has introduced SPT as an alternative lens to classical social theories to investigate social life that is often rooted in a nexus of social practices. This lens is applied by various prominent researchers such as Hargreaves (2011), Kuijer (2014), and Higginson et al. (2015) as a contemporary tool to investigate observable patterns of environmental practices and to promote an ideological shift away from 'victim blaming' (Spotswood et al., 2015, p. 30). This section has sought to demonstrate that analysing practice through the Shovian practice model entails considerations of how practices such as recycling can be constituted and linked together, as well as how practitioners can be recruited and retained. The next section outlines the current role of SPT in government debates and three prominent concepts to build practice-based interventions.

3.5 Practice-Based Interventions

As described above, SPT acts as a counterweight to classical social theories. Section 3.5.1 discusses the challenges of incorporating the concept of practice into government policy. Section 3.5.2 explores three potential SPT-driven interventions that build on substituting, recrafting, and interlocking practices with the goal to replace unsustainable elements, entire practices, or change the interconnection of bundles of practice (Spurling & Mcmeekin, 2015). Section 3.5.3 provides a short step-by-step guide to build interventions based on practice-based concepts, which could potentially be applied as a tool to the problem of underperforming recycling practices.

3.5.1 SPT in Government Debates

Over the last two decades, a subset of social researchers have shifted their attention to social practice theory, seeking a deeper understanding of social processes for education and policy consideration and thus creating a growing stream of analytical and diagnostic research (Spotswood et al., 2017; Strengers & Maller, 2015). Studies including Spaargaren (2011), Strengers and Maller (2012), Vihalemm et al. (2016), Greene (2018), and Kadibadiba et al. 2018) are internationally recognised for exploring the relevance of SPT as a potential theoretical guide to reframing sustainable policy. Using theory to offer multiple prospects for the delivery of change is important; however, most researchers view SPT as a theoretical counterweight, for example, to an ABC approach (Walker, 2015) and subsequently argue that they are very hard to merge and incorporate (Shove, 2010). This is due to the SPT' contradictive representation of, on the one hand, emergent internal, and on the other hand, independent external factors. This distinction and variance between both theories is described as "chalk and cheese" (Shove, 2010, p. 1279). Arguably, researchers assert that SPT should not be viewed as an addition to the repertoire of classical social theories as this could compromise the value of both bodies of theories. Instead, SPT should extend the list of potential conventional change strategies to choose from (Chatterton, 2011). The value of SPT lies in presenting an option for analysis that builds on a paradigmatic opposition to the predominant range of traditional actor- and norm-oriented models (Shove, 2010, 2014, 2015).

The application of SPT is proving an effective tool for the analysis of environmental issues. However, there are also inherent challenges when building practice-based intervention approaches. Such challenges have their origins in the argument that practice-based interventions require a change of systems or processes, or, as practice theorists Shove et al. (2012, p. 145) suggest, require policy to make 'serial adjustments' to an associated process or system in which environmental practices are performed. For example, the implementation of a CDS can be classified as a large-scale serial adjustment made by governments, since its introduction leads not only to legislative amendments but also the expansion of system infrastructures such as local recycling systems. Shove (2012) further argues that attempts to accommodate SPT within policy frameworks by introducing 'serial adjustments' but confining policy

provisions to traditional educational efforts is likely to diminish the critical value of the theory. Designing practice-based interventions is described as a more radical approach (Hampton, 2018), entailing the task of challenging the conventional notions of institutional power, hierarchy, and the role of governments. This can be burdensome insofar as the governance of practices evolves slowly and often unpredictably, shaped by a variety of factors, interests, and processes (Sharp et al., 2015; Watson, 2017). Therefore, the ontological commitment and complexity of the theory often contradicts with the realities of policy processes (Sahakian & Wilhite, 2014), hence there is an absence of a unified practice approach in the context of policy development (Hargreaves, 2011; Strengers et al., 2015). One would hope that the very existence of such potential obstacles in the immediate term posed by SPT would serve to precipitate changes in broader political processes in the longer term.

3.5.2 Three Potential Practice-Based Interventions

Many social theorists argue that SPT has the potential to inform discussions about sustainability and as such that policy interventions can and should face the complex and distributed relations of practices shaping everyday life, including consumer behaviours (Spurling et al., 2013). Within their book *Social Practices, Intervention and Sustainability,* European and Australian researchers jointly explore and consider the merit of practice-based interventions (Strengers & Maller, 2015). Their research suggests three potential intervention concepts, which are outlined in the following paragraphs.

Recrafting Practice Elements: Practice-based interventions can be applied on multiple levels, starting with targeting the elements of single performances to 'recrafting practices' (Spurling et al., 2013, p. 11). Recrafting practices is not new to environmental practitioners. Many environmental campaigns unknowingly target single elements such as meaning, for example by applying persuasion techniques through a multitude of "programmes grounded in theories of rationale and choice" (Shove et al., 2012, p. 146), and, as a logical corollary, also influence the dynamics of practice. As such the concept of recrafting practices does not necessarily interfere with current dominant ABC strategies. However, in their study of research consumption in

Australian households, Breadsell et al (2019) suggest that instead of applying large-scale campaigns, practice-based interventions should generally be characterised as a bottom-up approach due to their focus of changing the elements of a local practice. For example, this could be achieved by making respective design changes in someone's local environment. In comparison, persuasion methods typically applied in education campaigns address issues via a top-down approach. Although researchers argue that both approaches can complement each other and potentially can be incorporated into existing programs given adequate human, technical, and financial resources, a more successful way to address meaning would be at the local community level. Therefore, if approaches cannot be incorporated (e.g., in the context of at home recycling practices) the recrafting technique to achieve small design changes (e.g., through re-designing the physical space where recycling is practiced) should be favoured. If such changes do not compete with the timing and organisation of other established practices and respecting systems of practice, design changes offer the opportunity to achieve more long lasting change, compared to persuasion campaigns that are generally known to only make short-term impacts (Kuijer, 2014). Although beneficial in many ways, Strengers and Maller (2015) find that the mechanism of recrafting does not challenge the scale and extent of a performed practice in question, only its resource intensity (for example by replacing unsustainable with sustainable materiality such as more energy efficient electrical devices). Therefore, the mechanism is considered less impactful because the general trend of performing the practice is not challenged. However, in the context of one aim of this research — improving underperforming household kerbside recycling practices — recrafting may in some instances prove a valuable pathway for small interventions as it is not aimed at substituting the practice of recycling itself.

Substituting Single Practices: To challenge the performance of unsustainable practices, the next step in applying practice-based interventions is substituting stable performances that connect to an entity (such as driving to work by car) by replacing them with a new entity (such as riding a bike to work) (Spurling et al., 2013). In this sense, substituting practices means configuring all three elements of a practice by discouraging and replacing them with new elements, such as replacing driving with cycling (Spurling et al., 2013). This approach resonates with Breadsell et al (2019)

who argue that strong habitual routines embedded in daily life are hard to change via information (addressing competence) and persuasion techniques (addressing meaning) only. Rather, a change of infrastructure or tools (addressing material) following on from the building of new competencies and meanings can be advantageous. Although more complex to address, the multi-dimensional intervention of substituting practices is considered more effective than recrafting practices. Substituting practice builds new practices to change or replace specific needs and wants with a sustainable counterpart by identifying compatible practice alternatives and stimulating a cultural shift. In the context of this research, this could be linked to making use of CDSs instead of placing recyclable drink containers into co-mingled recycling bins.

Interlocking Practice Entities: The third concept in this trilogy acts within bundles of at-home practices or the 'Home System of Practice' (HSOP) (Breadsell et al., 2019) by changing the way practice entities 'interlock' (Spurling et al., 2013, p. 9). This involves intervening in their wider system (e.g., how households are provisioned and how personal routines are timed) and is considered the most powerful of the three intervention approaches. Every household is populated by multiple HSOPs, including shopping, storing, cooking, eating, and disposing of leftover food and packaging (Spurling et al., 2013). As visualised in Figure 3.6, one way to intervene in the wider systems is by considering the purpose of the targeted practice, identifying surrounding practices involved, and then re-negotiating needs and structures (Gonzalez-Arcos et al., 2021). Following Gonzalez-Arcos et al (2021), an interlocking practice is the most challenging of the three concepts to implement as changing the organisation of multiple practices in proximity can generate a high level of resistance to change.

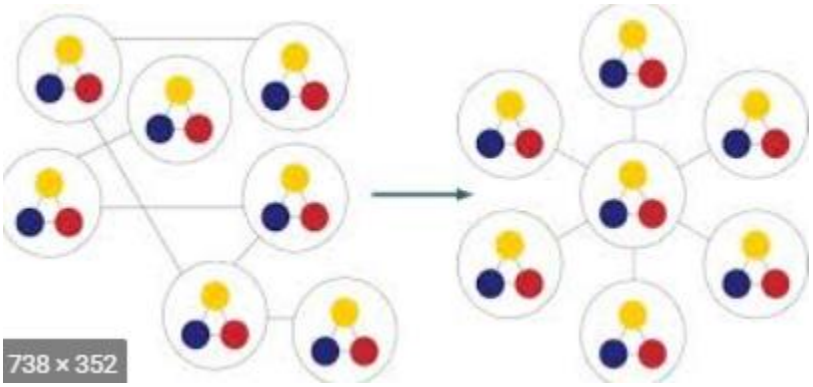


Figure 3.6: Interlocking Practice-Entities.

3.5.3 Step-By-Step Guide

In the context of initiatives that address sustainable consumption practices, researchers have pondered over the question of how to operationalise a SPT approach for policy application (Gonzalez-Arcos et al., 2021). This thesis builds on the finding of Müller et al. (2022), considering waste and recycling as the end of the linear process of food consumption practices within many social processes in a HSOP (Breadsell et al., 2019). In the context of the research problem of underperforming recycling rates, this research has the potential to open a discussion on the expansive concept of interlocking practices. As such this step-by-step guide focuses on the concept of interlocking practices. Moving the discussion beyond the boundaries of only one practice helps to expand the scope of replacing elements and single practices.

From their initial implementation, expansive practice-based initiatives that aim to interlock practices need to be rolled out systemically (Macrorie et al., 2015) in order to model significant relations and circuits of reproduction between connected practices (Shove et al., 2012). As suggested by Hargreaves (2011), prior to forming practice-based interventions, a practice performance or entity in question should be viewed as a by-product of other daily practice entities — thus the practice is reconfigured through its intersection with multiple social processes. Therefore, in order to interlock practices Strengers and Maller (2015) propose the following steps:

1. Gain a deep understanding of the targeted practice and its dynamics.

2. Map the system of actors and stakeholders involved in influencing the practice to identify links in the system relating to the desired practice change (Shove et al., 2012).
3. Design a range of tailored interventions including consideration of available resources (human, technical, and financial).
4. Recruit stakeholders to shape unsustainable elements giving consideration to interdisciplinarity.
5. Implement a coordinated campaign among stakeholders involved in influencing the practice in question to change practice entities (Shove et al., 2012).

Gonzalez-Arcos et al. (2021) suggest that one of the major challenges not only for classical behaviour change interventions but also practice-based interventions is to (un)link practices involved in an entity or HSOP to change a specific practice in question. Some researchers suggest that to learn to (un)link practices, the pathway of retrospectively applying a SPT lens to the outcomes of traditional behaviour change interventions could serve to gather insights (Evans, 2012; Hargreaves, 2011; Maller et al., 2012) to redirect campaigns in order to address specific elements or (un)link practices (Shove, 2010; Shove & Walker, 2010; Strengers, 2012). For Strengers and Maller, (2015) it remains unclear as to whether this approach is always productive. However, some theorists such as Watson et al. (2020) find that the retrospective practice approach has some merit for understanding practice and ideally overcoming practical issues of (un)linking.

3.6 Chapter Summary

Contemporary environmental issues are changing the broad fields in which education initiatives for sustainability are performed (Kemmis & Mutton, 2012). This chapter outlines the traditional positioning of policy regarding behavioural change that seeks to control behaviours through the provision of individual or collective encouragement, advice, and information (e.g., on sustainable technology, sustainable consumer choices, or sustainable actions) (Spurling et al., 2013). However, to achieve long lasting change for better environmental outcomes, research demonstrates that changing a ubiquitous set of subconscious social practices may be more impactful

(Gonzalez-Arcos et al., 2021). Put simply, practices are meaningful to people (Røpke, 2009). Therefore, this chapter is premised on the understanding that the underlying dynamics of social change (including household recycling) are best explained through the analysis of social practices. Understanding the social world through its constitutive practices has created fruitful ground for research on environmental issues. For example, research on consumption practices is moving beyond methodological individualism and structuralism by de-centralising the individual from the analysis of social life (Maller, 2012; Shove, 2010). However, underperforming household recycling practices included in at-home consumption processes have not yet been thoroughly investigated through the practice lens. This chapter demonstrates the merit of applying the Shove et al (2012) social practice model to the analysis of this practice. The model is conceptualised by the following main characteristics: (i) the world is populated by practices; (ii) practices consist of three categories of elements — meaning, competence and material — each required for a practice to live (practice-as-performance); (iii) practice elements can be shared by various practices (practice-as-entities); (iv) practice-as-performance and practice-as-entities are the foundation to form nexuses of interacting practices (Hui et al., 2016) that together make up social life (Reckwitz, 2002); (v) relations between practices can be competitive, collaborative, or reflect simple co-existence; and (vi) social change occurs through continuous reproduction of everyday life, where practices change when new elements are introduced, or current elements transform (Shove et al., 2012; Warde, 2005).

The Shovian social practice model — in contrast to conventional behaviour change approaches — affirms the need for material, competence, and meaning to be considered simultaneously. Kuijer (2014) adds to this concept by allowing multiple variations of practice performances to construct an entity that can be visualised. This allows us to develop a lens to magnify unsustainable patterns of social life within an arena of power relations, infrastructure, institutions, technologies, and societies (Røpke, 2009) in order to reveal unanticipated connections that might be overlooked in a conventional functionalist analysis (Hobson, 2002). This builds the foundation for this thesis to form approaches for targeting unsustainable recycling practices and potentially design practice-driven intervention strategies. However, it is firstly important to fully understand the practice in question. The following chapter outlines

how empirical data in the context of household recycling practices is collected and analysed through a SPT lens in this thesis.

Chapter 4: Methodology

4.1 Chapter Overview

This chapter outlines the research methodology undertaken to address the overarching focus of this research, namely in what ways social practice theory can contribute to a better understanding of household recycling practices in Australian metropolitan areas. The three sub-research questions are as follows: (1) What are the a) drivers of and b) barriers to household kerbside recycling practices? (2) What are the perceptions of environmental practitioners in relation to a) policy and b) practical measures that seek to improve household kerbside recycling practices? (3) In what ways can newly implemented recycling schemes such as the Western Australian Container Deposit Scheme contribute to the enhancement of recycling practices? In this thesis, the term environmental practitioners covers a broad definition of industry-related stakeholders including policy makers, environmental educators, academics, private businesses, and other industry influencers. This research focuses on environmental practitioners on the basis of their capacity to yield rich information on household recycling practices on a much broader scale than would be possible for individual residents. This chapter is organised as follows. Section 4.2 justifies the research design and Section 4.3 discusses the principles that ensure its credibility and integrity. This is followed by a description of Phase 1 (Section 4.4), Phase 2 (Section 4.5), and Phase 3 (Section 4.6). Section 4.7 presents the approach to data analysis. Finally, Section 4.8 concludes with a chapter summary.

4.2 Research Design and Justification

When it comes to choosing a research design for a practice-based study, SPT research is not tied to a specific set of research methods (Halkier & Jensen, 2011) [27]. As such, this thesis employs three qualitative research phases to identify patterns and insights regarding the social phenomenon in question (Australian household recycling)

[27] Halkier and Jensen (2011) identify a range of credible methods including participant observations, in-depth interviews, filmed observation, individual, family and group in-depth interviews, participant observation, auto-photography participant observation in meetings and events, voluntary internships, and historical case studies.

across various types of empirical data. Figure 4.1 illustrates the qualitative methods applied during the three phases, which are outlined in the following subsections.

Figure 4.1: The Three Research Phases.

4.2.1 Phase 1: Secondary Data Analysis

Halkier et al. (2011, p. 8) indicate that "all types of qualitative data [can be seen] as enactments (social action)". In their study of cycling as a social practice, Spotswood et al. (2015, p. 25) firstly examine secondary survey data as a base "to explore respondents' relationship with cycling in more depth through qualitative techniques". This thesis views secondary data analysis as a reliable method, asserting that a preliminary practice perspective can be gleaned from a range of secondary data sources since they are products of social actions expressing performances between people or responses between people. Spotswood et al. (2015, p. 26) further note that "it is common to rely mainly or even entirely on secondary data for analysis of practices" in reference to other practice researchers including Shove and Pantzar (2005), Shove et al. (2007), Watson and Shove (2008), and Hargreaves (2011).

4.2.2 Phase 2: Qualitative Interviews

Qualitative interviews are the most common method applied in social science, often combined with other qualitative methods to analyse a social phenomenon (Dunwoodie et al., 2022). Conducting face-to-face semi-structured qualitative interviews is recommended for practice-based research on the grounds that the ''dis-cursive interaction between researchers and research participants'' (Martens, 2012, p. 1) is a suitable approach to explore linkages between the elements of a practice and practices themselves. Adding to this argument, Hitchings (2012) asserts that discussions about practices are useful to produce empirical data. Social practices are,

to an extent, unconscious; however, their reflection nevertheless requires discourse, and the conversational aspect of semi-structured interviews allows experts to clarify what is needed to address possible variations. This aligns with Reckwitz (2002), who argues that there is no one unique way of performing practice. For example, every time people dispose of an item, the practice will look slightly different. Therefore, expert interviews with environmental practitioners are likely to deliver a broader range of information about possible variations of practice that may not be captured by an 'in the moment' observation.

4.2.3 Phase 3: Case Study

This thesis employs a case study approach to investigate how newly implemented recycling schemes can promote household recycling. This approach is built on a SPT perspective, premised on the understanding that building new practices embeds them in existing fluid, dynamic social contexts, socio-technical regimes, and systems of provision that shape their entities and performances (Shove, 2012). This analytical lens can provide useful information for environmental practitioners and policy makers (Evans, 2012; Hargreaves, 2011; Maller et al., 2012). It can furthermore help to provide recommendations for campaign adjustments to address specific elements of practice (Shove, 2010; Shove & Walker, 2010; Strengers, 2012). In addition, the data can enhance the robustness of Phases 1 and 2 by adding to the findings related to kerbside recycling practices insofar as sorting, separating, and returning drink containers requires a change to old disposal habits applied using the 2-bin system.

These three complementary research phases facilitate the analysis of household recycling practice through a practice-based lens and directly address the research questions. Specifically, as shown in Figure 4.2, Phases 1 and 2 seek to answer RQs 1 and 2. Phase 2 also contributes to the understanding of RQ 3, visualised via a dotted line connection between Phase 2 and RQ 3. Figure 4.2 also depicts the main contribution of Phase 3 to RQ 3. All three phases (1, 2, 3) ultimately contribute to answering the overarching research question.

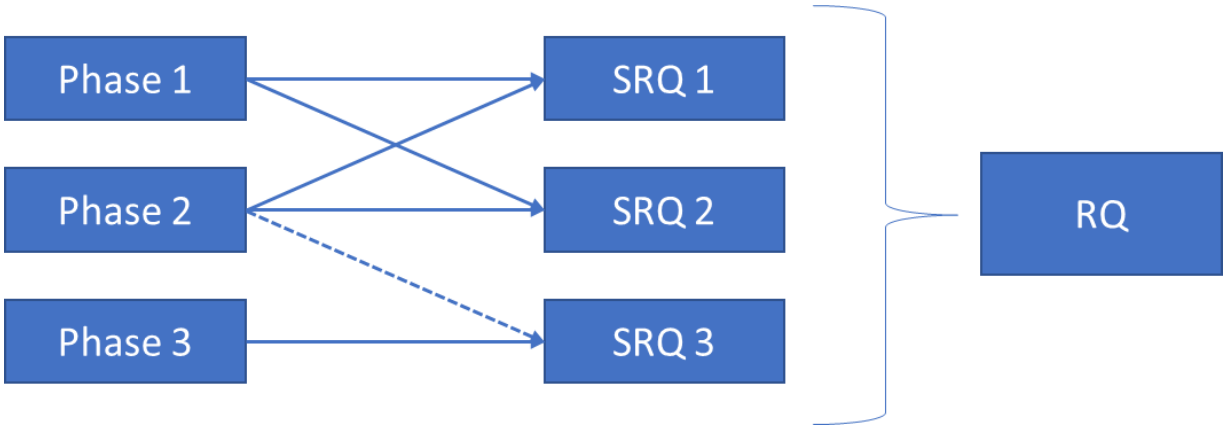


Figure 4.2: Relationship Between Research Phases and Research Questions.

4.3 Credibility and Integrity

To achieve credibility, research must "attempt to demonstrate that a true picture of the phenomenon under scrutiny is being presented" (Shenton, 2004, p. 63). The threefold approach of this thesis adds to its credibility by engaging with qualitative empirical data about the same phenomenon from different angles (Patton, 1999). This can avoid potential bias that could occur if only one method (e.g., interviews) is applied, as findings are validated across multiple datasets, mitigating this risk (Gunasekar, 2007). Method triangulations typically include qualitative interviews as they are one of the most powerful tools for the understanding of human behaviour (Carter et al., 2014). As a well-established method of data collection, the expert interviews have several additional merits adding to the credibility of this research (creating a true picture of the phenomenon). Firstly, the interviews build trust and create a comfortable atmosphere during discourses that can help reveal information that would otherwise be difficult to collect (Denzin & Lincoln, 2007, p 54). Secondly, the interviews allow the gathering of both retrospective and real-time information (Gioia et al., 2013). Thirdly, interviews allow the researcher the flexibility to change direction or position themselves clearly during discourses, including introducing unstructured questions that arise from unforeseeable context surfacing throughout the conversation (Hair et al., 2011). Finally, interviews provide sensitive contextual richness that can be checked against the synthesised findings from document analysis and vice versa.

Document analysis and a case study are also included as distinct methods with related inquiries to allow for additional perspectives and avoid the exclusion of facts that might not surface in the interviews. This allows for an expanded research breadth and a higher quality of the results. As a further indication of the credibility of this thesis, the threefold qualitative approach is conducted in accordance with ethical protocols as set out in the *Australian Code for the Responsible Conduct of Research* (*2018*) (National Health and Medical Research Council et al., 2018). A detailed description of the applied methods was reviewed by the UNDA Human Research Ethics Committee in accordance with the *National Statement on Ethical Conduct in Human Research (2007, updated 2018)* and classified Low Risk Ethics Approval was granted by the UNDA Human Research Ethics Committee (HREC) in October 2020 (Appendix A).

This thesis utilises data on recycling practices in Australian metropolitan areas. The integrity of data collection draws on this metropolitan focus. There are three zones of demographic classification in Australia, namely metropolitan, rural, and remote zones (Department of Health and Aged Care, 2022). The decision to focus on metropolitan areas is based on three main reasons. Firstly, metropolitan areas are high density areas with a growing population normally associated with higher incomes, more intensive use of packaging materials, and more disposable goods (Hoornweg and Bhada-Tata, 2012). This produces higher per capita disposal rates compared to regional and remote areas. Although contamination rates are generally higher in regional and remote areas (Agarwal et al., 2020), the trend of ongoing urbanisation — for example in NSW 65% of the population lives in Greater Sydney (NSW Government, 2022a) — indicates greater volumes of valuable resources are lost in metropolitan areas (OECD, 2008; Varotto & Spagnolli, 2017). Secondly, in metropolitan areas the vast majority of residents have access to household kerbside recycling bins as it is a standard service provided by LGs. In regional and remote areas this access is not guaranteed[28], making it less meaningful to include such areas in the analysis of this

[28] Although in April 2021 all environmental ministers agreed to the harmonisation of the collection of kerbside recycling across jurisdictions (e.g., bin size and frequency) and the implementation of standards such as access for all communities (Ministerial Forum, 2021), the dispersion of the population

research, as the results would not be comparable with metropolitan areas (DEE, 2018). Thirdly, Australian regional and remote areas merit their own focus, as they face distinct challenges related to isolation, which contribute to high costs, long travel distances, and cultural differences including a considerable Aboriginal and Torres Strait Islander population (Queensland Government, 2021).

This thesis investigates household recycling in metropolitan areas in generality; this means it does not investigate a subset of the community, for example those who are mindful about purchasing eco-friendly packaging or goods that are consistent with environmental standards (Seyfang, 2005).

4.4 Phase 1: Document Analysis

Qualitative document analysis is a systematic method for examining and evaluating textual data in either printed or electronic form (Bowen, 2009) in order to extract social meanings and insights to develop empirical knowledge (Corbin & Strauss, 2008). Atkinson and Coffey (1997, p. 47) define documents as "social facts" that can be in a range of formats, such as policy documents, reports, and strategy papers.

4.4.1 Purpose and Aim

The purpose of applying preliminary document analysis in Phase 1 of this study is to help contextualise how household kerbside recycling is typically practiced in Australia, including drivers and barriers, and to gather knowledge about planned improvements through advanced environmental policy frameworks. Therefore, Phase 1 comprises the preliminary analysis of various policy, survey, and research documents. Such documents can comprise valuable sources of information about household recycling practices to bring evidence to bear upon the research topic. Merriam (1988, p. 118) notes that "documents of all types can help the researcher uncover meaning, develop

across large geographical areas makes it an extraordinary challenge for LGs to connect all residents to kerbside recycling services. Since the financial viability of recycling services in some regional and remote areas is more marginal, this leaves regional and remote communities disadvantaged (Blue Environment, 2020).

understanding, and discover insights relevant to the research problem". Therefore, it is also legitimate to utilise document analysis to help answer RQ 2, as the perceptions of expert informants can be expressed through policy and legislation. Johnston (2014) indicates that the benefits of conducting preliminary secondary data analysis lie in accessibility to a vast amount of publicly available data that can provide guidance for the subsequent collection of primary data. Phase 1 investigates studies that have collected large amounts of data (e.g., through recycling surveys). The aim of this phase is also to use the preliminary insights from the analysis to enable the researcher to form a more in depth understanding of the aspects of the practice investigated prior to shaping the interview schedule questions for participants in Phases 2 and 3. This way, more insightful questions for the qualitative interviews can be developed.

4.4.2 Sample

For the purposes of this research a review of WARR surveys, policies, and research studies was undertaken. Through website searches, national, state, and territory-based documents that include information relevant for this study were identified. The website search commenced in July 2020. Throughout the study, documents were continuously added to the list of relevant materials. In total 56 policy documents, 26 resident surveys, 41 environmental programs, and 15 case studies were considered relevant to the topic of household recycling[29]. Due to recent industry developments caused by the China Sword, extensive media exposure of the industry, and review of existing WARR policy, the study parameters were refined to include all documents published from 2018 onwards. From the pool of policy and other documentation available after 2018, the 13 secondary data sources considered most relevant for this research were selected for final analysis. This includes five recycling surveys, both national and state-based (Table 4.1), five policy documents, both national and state-based[30] (Table 4.2), and three research studies (Table 4.3). Tables 4.1-4.3 also set

[29] A full list is available from the author upon request.

[30] Local governments also implement their own strategies; however, they have a long history of following the overall guidance and frameworks set out by the states and territories (known as a top-bottom approach) (Commonwealth of Australia, 2018b). Therefore, LG documents are not included in the analysis.

out the rationale behind the document selection. These documents are reliable and rigorous sources produced by governments or research agencies following a well justified methodological approach for data collection and analysis.

Recycling survey documents: In accordance with Spotswood et al. (2015) who affirm the importance of examining documents to better understand the status quo of practice, recycling survey results were examined to understand the status quo of recycling practices in Australian homes (Table 4.1). The overarching focus of the investigation includes not only how individuals' common beliefs and attitudes about recycling affect the practice, but on how recycling practices are constituted, how they are maintained, or are challenged and changed (Hargreaves, 2011).

No	Document	Rationale for inclusion
1	Recycling Behaviours Report Australians and recycling: attitudes, understanding and outlook (Cleanaway Waste Management Limited, 2021)	The Cleanaway survey represents the latest national recycling report at the beginning of the analysis. It offers a broad spectrum of insights from 1,000 study participants across all states. In the context of this research, it is considered important to gain a national overview before moving to state-based results.

2	Recycling Behaviours Report 2022 (Cleanaway Waste Management Limited, 2022)	Cleanaway's 2022 report was published after the analysis of the 2021 report. It was additionally included in Phase 1 as it represents a second wave of research that includes first time information on impacts of the Covid-19 pandemic on recycling behaviours. The report also includes findings from testing recycling aptitudes and compares results to self-reported capabilities to recycle and attitudes to wider environmental topics such as the circular economy, FOGO, and single-use plastic.
3	Behaviour Change Research: Identifying Priority Waste Behaviours (DWER, 2019)	This report by the WA Government combines results from industry expert consultations (15 participants) and a community survey (601 participants) to identify priority waste and recycling behaviours. As such, it assembles valuable data to further help contextualise recycling practices in order to identify its core elements.
4	Household Waste and Recycling Research Report (NSW EPA, 2016)	The report represents a mixed methods approach of qualitative interviews and group discussions and quantitative survey data (1,200 participants). It is older than the other documents but was chosen since in part it addresses recycling behaviours at multi-unit dwellings (MUDs) in metropolitan areas, which are one focus of this research.
5	Using a waste audit and a knowledge assessment survey to investigate plateauing MSW recycling rates in Australia (Moloney & Doolan, 2017)	This academic study combines bin audit data with survey responses, offering the possibility to compare theoretical and practical responses to recycling. The study investigates a 3-bin collection area which — in the context of this thesis — can help investigate if additional source separation changes recycling behaviours and outcomes.

Table 4.1: Recycling Surveys and Reports

Policy documents: A range of policy documents were analysed in order to capture and categorise the spectrum of national and state-wide targets, activities, and innovations related to household kerbside recycling. This is in line with Moloney and Strengers (2014) who argue that regulatory documents that have a direct impact on community infrastructures are key for the formation of social practices. Therefore, a careful selection of the most influential documents on household kerbside recycling at national and state level was undertaken at the specific point in time of this thesis (Table 4.2). In the wake of the China Sword, Australian WARR policy development is regularly reviewed as new challenges arise nationally (Australian Government, 2019), or in the case of states such as NSW and WA, every five years (Government of Western Australia, 2020; NSW DPIE, 2021).

The federal government has the responsibility to provide overall policy directions for household recycling; however, ample authority remains with the states and territories. Therefore, not only national, but also state-based data is selected for the analysis to assess if national guiding principles align with the view of jurisdictions and vice versa. Due to the scope of this thesis, the analysis of pivotal and recent WARR state-based strategy frameworks was necessarily narrowed down to two perspectives, New South Wales and Western Australia. These two states are chosen for three key reasons. Firstly, they have similar definitions of waste, which is important as Australia has no unified definition of waste. Although a National Waste Classification System was developed in the early 1990s as part of the Australian Waste Database (AWD), each jurisdiction has their own definitions. A study on waste classifications in Australia conducted by the Department of Sustainability, Environment, Water, Pollution, and Communities (DSEWPAC) (2022, p. 1) reports that "the classification systems in NSW and WA are (overall) considered partially aligned with the AWD system" and therefore it is possible to compare these jurisdictions. Secondly, both NSW and WA have comprehensive recycling and resource recovery infrastructure compared to Tasmania, the Northern Territory, and Queensland, who have traditionally focused on low rank waste hierarchy principles (Government of South Australia, 2015). States that follow the mid rank waste hierarchy principles (such as NSW and WA) generally offer multiple options for the separation and collection of recyclables at the household level and are easier to compare. Thirdly, these states have growing volumes but underperforming recycling rates. Of all the states, NSW has the largest and fastest growing population (NSW Government, 2022a) producing one-third of Australia's total waste. In the context of MSW, the state currently recycles only two-thirds generated (43%[31]), significantly underperforming in the context of its targeted kerbside recycling rates (70% by 2022)(Department of Planning Industry and Environment, 2021). In the context of growth, WA is the jurisdiction with the highest rate of waste generated per capita, with a metropolitan MSW recovery rate of 31%, also well below their 70% target (by 2030) (Department of Water and Environmental Regulation, 2021). In the context of kerbside recycling, historical data from both states also reveals a lack of any sustained improvement of recovery rates since 2014/15 (NSW DPIE, 2021; DWER,

[31] Current data for the financial year 2022/23 is not yet available.

2021). Although the WARR sector has lately received more attention and is in transition due to current international market disruptions, both states are not likely to achieve their current and future recovery targets. The similarity of these large-scale challenges in both states make them suitable for analysis in this study.

No	Document	Rationale for inclusion
1	National Waste Policy (NWP) (Commonwealth of Australia, 2018)	The NWP includes fundamental principles and strategies for WARR, setting directions for all state governments.
2	National Waste Policy Action Plan 2019 (NWPAP) (Australian Government, 2019)	The NWPAP comprises six primary objectives, a specific range of actions, timetables, and designated funding to implement the NWP principles. The analysis centres on measures and actions proposed to increase kerbside recycling rates and reduce contamination.
3	2021 Progress Summary Report (DCCEEW, 2021b)	The Progress Report identifies achievements in the context of the research problem made in the first two years of delivery of the NWPAP.
4	WA - Waste Avoidance and Resource Recovery Strategy 2030 (Waste Authority, 2019)	The strategy is WA's current state-wide guide for WARR.
5	NSW - Waste and Sustainable Materials Strategy 2041: Stage 1[32] – 2021-2027 (NSW DPIE, 2021)	The strategy is NSW's current state-wide guide for WARR.

Table 4.2: National Policy and State Strategy Documents

Research documents: The latest research undertaken by the federal government and independent research organisations is included in Phase 1 as an important source of further evidence and insights bearing on the research problem (Table 4.3). These documents relate to state-based waste data, behavioural insights, and current industry frameworks. They also provide evidence-based recommendations and feedback in the context of effective interventions to reduce contamination, along with roadmaps to overcome significant industry challenges.

[32] The document is the first stage working version of the NSW Waste and Sustainable Materials Strategy 2041.

No	Document	Rationale for inclusion
1	National Waste Report (NWR) (Blue Environment, 2020; 2022) (Blue Environment, 2022)	The National Waste Report is a series of reports published every two years since 2010. Historically, waste data has been poorly reported, building a weak evidence base for the political process (Jones, 2020a). At the time of this thesis, the latest report from 2020[33] was the most reliable source of qualitative and quantitative data to assess the latest developments in the waste industry. In the context of this research, it provides the most up-to-date evidence available on kerbside recycling rates, material flows, and state-based, national, and global trends. As such, it helps to corroborate the findings from policy and survey analyses.
2	Circular economy roadmap for plastics, glass, paper, and tyres (CSIRO, 2021)	The roadmap addresses current industry challenges in the context of recyclable materials by providing fundamental directions for the federal government to generate higher value of such materials. This includes setting out measures to improve the kerbside recycling feedstock to unlock the nation's potential for recycling plastics, glass, and paper locally.
3	Reducing Contamination of Household Recycling - A Rapid Evidence and Practice Review for Behavioural Public Policy (Kaufman et al., 2020)	In response to the need for more research on the behaviour-related issue of kerbside recycling contamination, the federal government engaged the research organisation BehaviourWorks Australia. The agency produced a rapid evidence and practice review for behavioural public policy consideration. The report was chosen as a central part of the preliminary document analysis as it delivers insights from 137 papers and 17 Australian environmental practitioners on recycling interventions to reduce contamination and improve recycling skills.

Table 4.3: Research Documents

4.5 Phase 2: Expert Interviews with Environmental Practitioners

In Phase 2, semi-structured qualitative interviews were undertaken to further understand how household recycling practices are operationalised through the views

[33] Six months before thesis submission, the NWR 2022 was released. The report is included in the analysis to update relevant data.

of environmental practitioners. This phase comprises the main data collection component of this study.

4.5.1 Purpose and Aim

The purpose of conducting one-on-one expert interviews with a range of environmental practitioners is to investigate their perceptions of household recycling in Australian homes, predominantly aiming to investigate two areas: household kerbside recycling practices (including barriers and drivers) and policy interventions and practical measures applied in Australia to improve such practices. Specifically, the aim of the analysis of discursive interactions between the researcher and environmental practitioners through a practice lens lies within identifying shared collective meanings to identify problematic behavioural patterns (practice elements) and practices across data (Shove et al., 2012). Furthermore, SPT functions as a tool to gain an understanding of hierarchies and linkages between discussed patterns and practices in order to reveal features, variations, deficiencies, irregularities, and similarities (Spotswood et al., 2015). Additionally, interviews allow the investigation of which aspects of recycling and other practices are centrally involved in the processes of future change and stability.

4.5.2 Sample

A total of 37 environmental practitioners were interviewed, generating 1,800 minutes of interview time. Guest et al. (2006) suggest that for a PhD study, an average of 12 interviews is sufficient to reach knowledge saturation when interviewees have experience in the same field. Data saturation is reached when the ability to obtain additional new information for the intended purpose has been exhausted, and further coding seems no longer feasible. To obtain a rich dataset for a practice-based study, the usual choice of primary data collection is participant observation (Halkier & Jensen, 2011). However, expert interviews can be equally justified. To ensure sufficient depth of data, this thesis exceeds the recommended sample size of Guest et al. (2006) by including a diverse set of expert perspectives from multiple governments (national and state based) holding varying roles and within varying stakeholder categories. Hargreaves (2011) uses a similar sample size of 38 semi-structured interviews in his

study of a behavioural change initiative to investigate environmental practice change. A large sample (here 37) across states and territories can help identify cross-sectional recycling trends, strategies, and measures to build an important understanding of common behavioural problems. Table 4.4 outlines the number of participants that were recruited per state and territory. During the recruitment process, no experts from Queensland or Tasmania could be recruited; this limitation is further discussed in Chapter 7.

Federal, State or Territory	Number of interviewees
Australian Capital Territory (ACT)	1
New South Wales (NSW)	14
South Australia (SA)	2
Western Australia (WA)	14
Northern Territory (NT)	1
Victoria (VIC)	4
Federal Government	1

Table 4.4: Interview Participants.

The participants are environmental practitioners, including policy makers, environmental educators, academics, and private business or other industry influencers who have worked for a minimum of three years in a significant managerial position. Practitioners interviewed in this field study are classified as industry members (Ind), waste influencers (Inf), or local or state government public servants (LG or SG), as shown in Table 4.5.

Environmental practitioner categories	Number of interviewees
Industry Member	8

Waste influencer	11
Local Government Public Servant (LG)	12
State Government Public Servant (SG)	6
Total	**37**

Table 4.5: Categories of Environmental Practitioners Interviewed

Table 4.6 provides a detailed summary of the interviewees and their characteristics. The table is organised by interviewee code, dictated by the sequential order of the interviews. The table provides information on the role of the interviewee and the type of organisation in which they work, the length of the interview, and the state where they reside. Worthy of note is that one interviewee is an Indigenous Australian who was able to provide insights into Indigenous perspectives on the environment and the practice of recycling. Overall, this pool of interviewees builds a strong sample in the interest of gathering a broad spectrum of relevant information from each part of the system.

Role	Stakeholder	State	nterviewee Nc	Round
Sustainability Manager	Industry	NSW	Ind-012	1
Regional Manager	Industry	WA	Ind-017	2
Business Manager	Industry	WA	Ind-021	2
Program Manager	Industry	WA	Ind-024	2
Operations State Manager	Industry	ACT	Ind-031	3
CEO & Founder	Industry	NT	Ind-032	3
Director	Industry	SA	Ind-036	3
Unemployed at time of the inteview	Industry	NSW	Ind-007	1
Founder	Influencer	VIC	Inf-002	1
Consultant	Influencer	NSW	Inf-011	1
Recycling Campaign Manager	Influencer	Federal	Inf-016	1
Founder	Influencer	WA	Inf-022	2
Executive Director	Influencer	SA	Inf-025	3
Managing Director	Influencer	NSW	Inf-026	3
Executive Director	Influencer	NSW	Inf-027	3
CEO	Influencer	NSW	Inf-028	3
Director	Influencer	VIC	Inf-030	3
CEO & Founder	Influencer	NSW	Inf-033	3
Product stewardship and sustainability consultar	Influencer	VIC	Inf-037	3
Executive Manager	Local governmen	WA	LG-001	1
Waste Project Officer	Local governmen	WA	LG-003	1
Resource Recovery Education Officer	Local governmen	NSW	LG-005	1
Project Officer Resource Recovery	Local governmen	NSW	LG-006	1
Waste Education Officer	Local governmen	WA	LG-008	1
Manager Visitor Experience and Events	Local governmen	NSW	LG-009	1
Executive Manager	Local governmen	WA	LG-010	1
Waste Management Officer	Local governmen	WA	LG-013	1
Outreach Officer, Waste Avoidance Team	Local governmen	NSW	LG-014	1
Waste Education Officer	Local governmen	NSW	LG-015	1
Manager Waste and Recycling	Local governmen	WA	LG-018	2
Manager Communications and Education	Local governmen	WA	LG-023	2
Senior Programs Officer	State governmen	WA	SG-004	1
Manager, Strategic Policy	State governmen	WA	SG-019	2
Senior Manager	State governmen	WA	SG-020	2
Senior Manager	State governmen	NSW	SG-029	3
CEO	State governmen	VIC	SG-034	3
Education and Programs Division	State governmen	NSW	SG-035	3

Table 4.6: Profiles of Environmental Practitioners Interviewed in Phase 2.

Each participant was recruited by initially reaching out to the professional network of the researcher. Concurrently, the research proposal was presented at three industry events that took place prior to Phase 2: NSW WMRR Young Professionals monthly meeting (June 2019); WA Waste and Recycling Conference annual conference

(October 2019); and WA Consistent Communications Collective quarterly meeting (April 2020). Recruitment was supported by a snowball technique applied after each interview in which participants were asked to recommend or nominate other potential participants from their professional network (Patrick et al., 1998).

4.5.3 Interview Schedule

As shown in Table 4.7, the interviews were conducted in three rounds over a period of 12 months. Prior to every interview, via e-mail, each practitioner was provided with a participant information sheet (Appendix B) and a consent form (Appendix C) to sign. The signed consent forms were collected before each interview started and saved, compliant with the University of Notre Dame Australia's (UNDA) research regulations on a secure server provided by UNDA. The interviews were digitally recorded and transcribed verbatim. The data was also saved on a secure server provided by UNDA. This process was also applied to the interviews conducted in Phase 3 of this study.

Round	Timeframe	Number of Interviews
Round 1	October 2020	16
Round 2	April 2021	8
Round 3	November 2021	13

Table 4.7: Interview Rounds in Phase 2.

The interviews were conducted face-to-face via Zoom guided by an interview schedule (Appendix D). The interview schedule includes different types of open-ended interview questions (Gioia et al., 2013) to address RQs 1 and 2. These open-ended questions allowed a measure of flexibility to explore lines of enquiry in greater depth, characterising the interview style as semi-structured (Showkat & Parveen, 2017). The questions were initially conceptualised by building on insights from the preliminary review of literature and data analysis conducted during Phase 1.

The interview scheduled comprised 14 questions. Interview questions 1 to 9 targeted the social milieu of household recycling to disentangle the practice and reveal drivers and barriers. Appendix E presents examples of barriers identified by participants. The approximate 300 comments coded from the answers of the 34 participants is a clear indication of the complexity of this topic. As recycling is an integral part of the consumption system (Borello, 2020), the schedule includes a question (question 9) in relation to the intersection between recycling practices and other practices. However, in order to target RQs 1 and 2, the main focus of the interview schedule bears on recycling practices themselves and how they are addressed by authorities. Therefore, questions 10-13 targeted practitioners' actions to improve recycling outcomes as well as perceptions of required actions, higher system level trends, ambitions, and challenges to achieve PEBC. The interview schedule for Phase 2 also included one question that contributed to Phase 3, namely the WA CDS case study (question 14). Although during Phase 3 expert interviews specifically tailored to explore the WA CDS were conducted, a general discussion on CDS across the Phase 2 sample benefited the study via gathering views from experts from more states and territories (New South Wales, the Australian Capital Territory, and Western Australia)[34] running schemes of similar maturity and design.

4.6 Phase 3: Case Study

The third research phase comprises a qualitative case study evaluation of a newly implemented Container Deposit Scheme (CDS) in WA. Case study research is widely acknowledged in social science, particularly for in-depth explorations of a social phenomenon (Yin, 2003) such as waste and recycling practices (Schatzki, 2018). It

[34] Experts from South Australia and the Northern Territory where schemes have been in place for approximately 20 and 40 years, respectively, are excluded from the question. Due to their significantly higher container return rates per resident, O'Dwyer (2022) suggest that further research into scheme maturity as an indicator to scheme acceptance and the development of behavioural patterns should be conducted. At the point in time when the interviews took place, Victoria had no CDS; hence interviewees were likewise not asked the question. No environmental practitioners from Queensland was recruited. Addressing the question to practitioners from states running schemes of similar maturity helped to ensure the relevance of responses to RQ 3.

builds on an intensive, internal examination of a system as it evolves (Flyvbjerg, 2006). Further, case study research involves an investigation of complex settings using multiple methods to capture all relevant aspects of an intervention (Keen & Packwood, 1995). In the context of a real-life government program such as a newly implemented recycling scheme, a case study is an appropriate and reliable tool to ascertain its efficiency (Zainal, 2007).

4.6.1 Purpose and Aim

This phase seeks to answer RQ 3 by investigating the impact of a newly implemented CDS in WA and how it improves household recycling by retrospectively applying a SPT lens to the outcomes of the behaviour change intervention. This approach can provide insights into how to (un)link practices (Evans, 2012; Hargreaves, 2011; Maller et al., 2012). The case study aims to investigate the promotional efforts that trigger scheme participation and which drivers and barriers influence change in practice for this specific case. This can situate the relationship between the requirements for scheme participation and the adaptation of old and adoption of new practices[35].

4.6.2 Sample

The WA CDS was introduced during the time of the research (1st of October 2020) (O'Dwyer, 2022), enabling the researcher to schedule interviews with experts from WA 12 months after the scheme commenced, which is considered a reasonable amount of time to collect data after the scheme's initial introductory phase. Furthermore, this research was supported by the Department of Water and Environmental Regulation (DWER) and the WA scheme coordinator, which facilitated access to resident surveys that are not in the public domain.

[35] Collecting and returning drink containers requires a change of old disposal habits applied using the 2-bin system and building new practices inside and outside the home. This change might also relate to or impact other practices or practice-entities.

In order to understand how and to what extent new practices develop in the context of this large-scale environmental initiative, data collection focused on topics in relation to the degree of public acceptance, along with barriers, drivers, and the development of new practices. This data includes publicly available secondary data and expert interviews. In the first step, secondary data available in the public domain (such as regulatory documents, website content, and promotional materials) were reviewed in order to briefly describe the WA scheme's design and targets. In the second step, resident surveys and academic studies outlined in Table 4.8 were investigated. The first three documents include resident survey data undertaken every 8 months after the commencement of the scheme. This data provides a range of insights into the scheme use as well as drivers and barriers to the practice that can be dissected into practice elements. Both steps of secondary data investigation supplement and enhance the primary data collected in the next step.

No	Document	Rationale for inclusion
1	Community Perception of Containers for Change (DWER, 2021)	Conducted 6 months after scheme commencement, this study was included in the investigation to understand which drivers and barriers impact on community perceptions of and engagement in the scheme.
2	6 MONTHLY DIP (WARRRL, 2022a)	This survey was conducted as part of the four step research series assessing participation and sentiment for the WA scheme. The last wave of this research series (February 2022) more deeply explores CDS recycling behaviour among Perth residents, delivering valuable insights to assess the new practice.
3	The Uptake of Container Deposit Schemes: A Case Study in Perth, Western Australia (O'Dwyer et al., 2022)	This journal article was released by the Perth-based Curtin University representing the only available piece of academic research conducted in the context of the newly implemented WA scheme. It analyses more than 400 participant responses across metropolitan Perth, discussing the drivers and barriers to scheme participation.
4	Report on the effects of the container deposit scheme on beverage prices in Western Australia (Economic Regulation Authority WA, 2021)	The report analyses the effect of scheme implementation on beverage prices and respectively outlines how consumers perceive cost increases (degree of complaints). The investigation of complaints can help understand how incentivising the 10 cent deposit value consumers receive per container upon return is regarded.

Table 4.8: Survey Documents Relating to the WA CDS.

In the third step, responses to a CDS-related interview question included in Phase 2 were analysed. Furthermore, five additional interviews with environmental practitioners from Phase 2 (only scheme experts from WA) were conducted for data collection one year after scheme commencement. Choosing to invite practitioners from Phase 2 to a follow up interview provided an existing level of trust between interviewee and researcher and familiarity with the process. As outlined in Table 4.9, all five practitioners interviewed held positions in organisations directly involved in the operation and/or promotion of the WA CDS either at industry level (Ind) or local or state government level (LG or SG). At the time of the interviews, one interviewee was working for an industry organisation running container refund points in communities; two interviewees were responsible for operations at a LG level; and two interviewees developed scheme regulations and oversaw the scheme at state government level.

Role	Stakeholder	State	Interviewee No	Minutes	Round
Business Manager	Industry	WA	Int-034		4
CEO	Local government	WA	Int-023		4
Manager Waste and Recycling	Local government	WA	Int-039		4
Senior Programs Officer	State government	WA	Int-040		4
Manager, Strategic Policy	State government	WA	Int-019		4

Table 4.9: Roles and Categories of WA CDS Experts Interviewed During Phase 3.

4.6.3 Interview Schedule

The interviews were scheduled 12 months after the commencement of the WA scheme (October 2020). Prior to the Phase 3 interviews, experts went through the same administrative process as described in Phase 2. The interviews were guided by the schedule outlined in Appendix D. The questions focused on the nature of the practice changes observed by experts; emergence of other practice change and materials used; and shifting meanings and competencies. Questions 1-6 target the reasons for scheme success or failure. Questions 7 and 8 address the meaning of practice in the context of environmental topics.

4.7 Approach to Analysis

The empirical datasets collected through Phases 1-3 were managed and analysed using NVivo 12.0. The analysis of documentary sources is an empirical task that requires a systematic process with procedural and evaluative steps (Bowen, 2009). NVivo 12.0. supports such steps by facilitating the organisation, coding, and tracking of codes and memorandums of data. It enables the researcher to effectively identify and classify large numbers of codes and categories as well as move, reorder, and set up components and linkages between different types of data, codes, and categories.

In each research phase, qualitative content analysis was undertaken to analyse the empirical data. Qualitative content analysis can serve varying degrees of interpretation and abstraction and therefore includes a variety of approaches for the investigation of data (Hsieh & Shannon, 2005). In this research, qualitative inductive content analysis was applied. This widely known and commonly adopted analytical procedure is utilised in SPT studies by researchers such as (Epp et al. 2014) to understand how practices entail the reproduction of cultural meanings, socially learnt skills, and common materials (Spurling et al., 2013) and are rooted within a variety of interconnections of other related practices (Schatzki, 2018).

In this research an abundance of secondary data sources related to recycling were read line-by-line and coded inductively with the aim to identify emergent themes reflecting similarities and differences within the data to answer the research questions (Graneheim et al., 2017). For example, during inductive coding of the data related to RQ 1, the concept of practice-as-performance (Schatzki et al., 2001) was kept front of mind to investigate the activity of recycling (Keller et al., 2016). Similarly, during the coding of data related to RQ 2, the concept of practice-as-entity was kept front of mind “to sketch patterns of historical development and understand [the wider] context” (Breadsell et al., 2019, p. 8) of household recycling. During Phase 3, both approaches were kept in mind to understand the effect of a newly implemented recycling scheme on practice.

Throughout all three phases, the data coding process was undertaken consistently, iteratively, and reflexively (Smith & Sparkes, 2018). The process led to a large amount of coded content (in NVivo these are called 'references') that was further organised into themes to structure the data. For example, during Phase 2, over 30 hours of interview recordings amounting to over 600 pages of raw data transcriptions were coded into 435 references and 34 themes. Themes and their tentative relationships can provide contextual insight to form a better understanding of practice as argued in previous SPT driven environmental studies (Halkier & Jensen, 2011; Hargreaves, 2011). In this study, themes were critically reviewed (back and forth) and grouped into major categories (Gioia et al., 2013; Hall & Steiner, 2020). Building this structure in NVivo was a crucial part of the analysis as it allowed the conceptual breakdown of the data and the ordering of numerous codes into a sensible visual aid (Gioia et al., 2013).

In the next step, the themes under each dominant category were re-organised into aggregated practice element dimensions (material, competence, and meaning) (Shove et al., 2012). In this context, the preliminary organisation of the data through inductive coding provided a scaffold for the elements of practice that produce the behaviour under investigation. In this manner, practice becomes the smallest unit of analysis as opposed to individuals, social structures, or discourses (Schatzki, 2002). Figure 4.3 exemplifies the data structure created during the analysis, providing a visual representation of how the study progressed. The allocation of categorised themes into aggregated dimensions of practice involves both inductive content analysis and deductive category application (Atkinson & Coffey, 1997) where "data and existing theory are now considered in tandem" (Gioia et al., 2013, p. 21). This is when SPT is applied as a contemporary tool or lens to magnify the dynamic, recursive, and elemental aspects of household recycling practices (Geels 2012; Hargreaves, 2011; Reckwitz, 2002; Shove, 2012). This approach can generate new findings to enrich the analytical depth of the social phenomenon through direct association to components of the theory. This can also enable the researcher to validate and extend theory (Hsieh & Shannon, 2005). In the context of this research, the combination of both inductive and deductive reasoning is employed to better understand household recycling practices and advance the theoretical components of the social phenomenon.

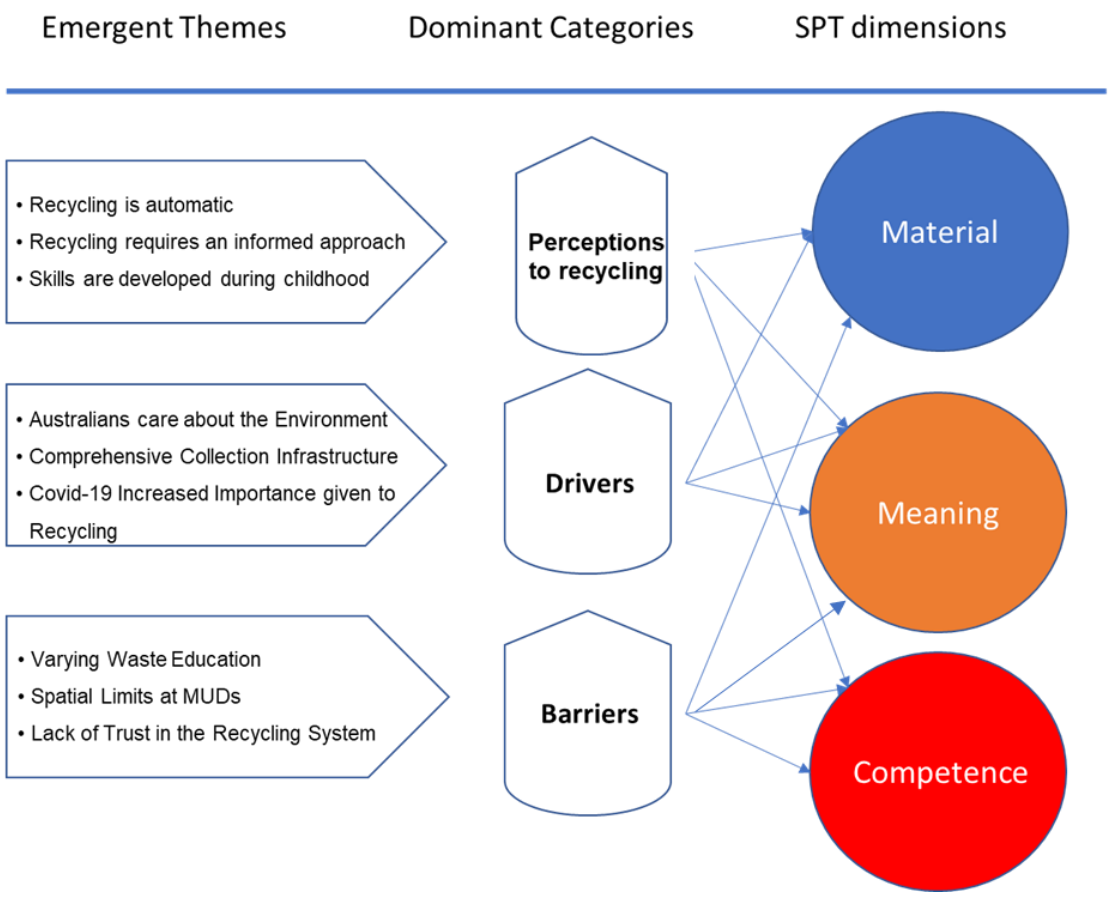


Figure 4.3: Exemplified Data Structure.

4.8 Chapter Summary

This chapter describes and justifies the application of a threefold qualitative research design. The three phases are conducted sequentially, with Phases 2 and 3 collecting primary data in the context of the research problem. This methodological approach facilitates the investigation of multiple facets of household recycling practices and provides an in-depth understanding of how these practices are embedded in the wider system. The next chapter presents the research findings.

Chapter 5: Findings

5.1 Chapter Overview

Having discussed the value of Social Practice Theory and the methodology chosen for this study in the previous chapters, this chapter presents the findings from the three phases of the field study. Firstly, the findings from the investigation of household kerbside recycling practices are presented. Secondly, it outlines which policy interventions and practical measures are applied by environmental practitioners to improve such behaviours. Thirdly, the impact of CDSs to increase source separation amongst residents is highlighted. To achieve this logical structure within the sections this chapter presents information extracted from the field study as follows: Sections 5.2 and 5.3 present the findings of Phases 1 and 2 where the focus of the analysis is on kerbside recycling. These phases seek to answer RQs 1 and 2, again, respectively, to enhance knowledge on a) the perceptions of lived household kerbside practice and b) government responses to improve recycling practices in Australia. Section 5.4 describes the main findings from Phase 3. The construction of an informative narrative through the careful presentation of the findings from the three phases builds the foundation to drive the analysis toward new conceptual development and theoretical advancement (Gioia et al., 2013). Finally, Section 5.5 concludes with a chapter summary.

It should be noted that the research findings in this chapter are not yet directly linked and discussed in the context of SPT as this chapter has a more descriptive than analytical purpose. The analytical part involving the linking findings to the theory is undertaken in Chapter 6. However, in this chapter the described findings are connected to more common theoretical implications in the context of behaviour and behaviour change such as those advanced by purpose-oriented and norm-oriented theory as described in Chapter 3.

5.2 The Existing Kerbside Recycling Landscape

This section presents the findings emerging from the content analysis of five national and state-based recycling surveys (Phase 1) and 37 expert interviews (Phase 2). The findings present insights regarding the perception (Section 5.2.1), drivers (Section 5.2.2), and barriers (Section 5.2.3) to household recycling in Australian metropolitan

areas. It is important to note that this study does not include a behavioural comparison between Australian states, as underperforming recycling rates are a national problem.

5.2.1 Perception of Kerbside Recycling

The most relevant finding emerging from national and state-based recycling surveys is that kerbside recycling is perceived by metropolitan residents as a common practice undertaken in a reflexive manner: "Recycling for me is just automatic, I don't plan it, it just happens as it is low effort, and often low involvement" (IPSOS, 2016, p. 5). The automatic nature of recycling described by 1,200 NSW residents in the IPSOS (2016) survey suggests that recycling is mainly practiced as an automatic and emotional response to daily routines rather than a rational and cognitive response. This finding aligns with the definition of practices proposed by Shove (2012), as recycling can be viewed as a constant, omnipresent, and recognisable practice mostly executed subconsciously and habitually. Furthermore, recycling is perceived as a positive act: "Consistent with previous research findings, most people want to do the right thing and dispose of their waste correctly" (DWER, 2019, p. 7).

Australian residents performing recycling practices often rely on knowledge established in their childhood ref. Skill formation at a young age is a strong enabler of establishing habits, which can also be referred to as 'automated performances' (Gram-Hanssen, 2010). During the Phase 2 interviews, 15 experts acknowledged two main reasons for the fact that recycling skill formation occurs at a young age, namely the morals and values of parents and educational programs at primary school. Firstly, "well-educated communities have an obligation to set examples for our children and for everyone else in our community" (Inf-022). This is because:

"The younger generation are going to be facing much bigger environmental challenges, than I had to deal with. In my lifetime a lot of the problems were a bit theoretical [not as tangible]. A kid that's between 5 and 10 [years old] today is going to be facing some pretty devastating environmental challenges in their lifetime" (Inf-037).

Interviewees emphasised a focus on waste education at primary level: "schools education was always a big part of what we did in our education programs, to get to

the parents through the kids. And that started probably like 10-15 years ago" (LG-001). As described in Chapter 2, many schools in Australian jurisdictions focus on environmental education, typically funded by the waste levy. Additionally, four experts suggest that a strong focus on education at the primary level can also help educate adults: "This is the best way to lecture parents about what's right and what's wrong", which leads to some children "hammering their parents about how ecologically terrible they are" (Ind-007).

The above findings infer that experts view skill formation on environmental responsibility at a young age as a strong component that "over time will dramatically change the culture of how we operate and create a culture of recyclers" (Ind-007). This aligns with studies such as Reckwitz (2002, p. 251), outlines that learning a practice at a young age can lead to a culturally shared understanding, 'a knowing how to do something', that is largely implicit. Current national survey data shows that 92% of Australian residents believe recycling is important (Cleanaway Waste Management Limited, 2022, p. 4). This reflects decades of recycling education at schools, making it an embedded shared meaning rather than the result of everyday conscious thought. This aligns with Shove et al. (2012, p. 12), who indicate that through the lens of ''theories of practice [one can] emphasize tacit and unconscious forms of knowledge and experience through which shared ways of understanding and being in the world are established, through which purposes emerge as desirable, and norms as legitimate''.

However, even though recycling is perceived as a culturally shared and important practice, interviewees from all categories of this field study sample suggest that to practice recycling correctly, skill formation and correct knowledge needs to be built and maintained to allocate waste in the correct bins. This is a necessary prerequisite for residents to produce a clean uncontaminated recycling stream. Building skills to perform correct source separation requires "the ability of someone taking an informed approach to make the effort and check what can be recycled" (Ind-036), which furthermore requires "giving people information so they can make the right decision about what bin they should put an item in" (Inf-033). As observed by one interviewee,

a “knowledgeable householder is someone who knows the difference between what can and can't be recycled” (SG-035). However, several interviewees acknowledged the complexity behind knowing how to recycle correctly, as recycling skills are involved in many intersecting activities. The following quote provides an illustrative example of the complexity surrounding recycling practice:

> *“I think it's everything we do to make decisions about disposal or recycling. It's obviously the decisions we make in the kitchen to source separate. And not only item separation but making decisions about: do we take the plastic window off an envelope? Do we crush our milk carton before we put it into the bin? Do we look at recycling logos before we make decisions? Do we collect things in separate containers?” (Inf-037)*

In view of this complexity, the adoption of a ‘systems approach’ (Blackmore & Smyth, 2002) when engaging in household recycling as a practice recasts the problem in its broad context. This approach requires a shift away from the reductionist approach based on improving simple skills to a conception of intersecting activities or a practice entity.

When asked if recycling intersects with other practices such as cooking, cleaning, and shopping, a small number of experts (3) found that in a wider context household kerbside recycling should be seen as a practice intersecting with other daily practices as “there's all these other things you do [at home] before you get to that recycling decision” (Inf-018). For example, Inf-028 raised an example related to other consumption practices such as shopping and considering that sustainable thinking starts outside the home with questions like “what's coming into the household in the first instance?” and “are we purchasing products that can be recovered?” (Inf-028). These quotes from Inf-018 and Inf-028 indicate a growing awareness of recycling as an intersecting activity amongst other practices. This finding underpins the interconnectedness of practice-entities within wider systems of practices (Schatzki, 2002; Shove et al., 2012).

The concept of systems of practice and their influential links between entities, here the connection of recycling with other consumption practices, may not be an omnipresent

view amongst Australian environmental practitioners. Overall, no practical measures are identified to build a link between the promotion of sustainable consumption practices (such as shopping) and the achievement of better recycling outcomes. Although the ARL on consumer packaging appears to be a potential aid for educational advancement, as it symbolises an intersecting component ‘threading through’ (Hui et al., 2017, p. 4) multiple environments of practices of consumption, its promotion campaign ‘check it before you chuck it’ (Australian Packaging Covenant, 2022) is squarely focused on the single home domain. Potential future research in the context of capitalising on the logo in the context of systems of consumption practice is further discussed in Chapter 7.

5.2.2 Drivers of Kerbside Recycling

This section describes key drivers of kerbside recycling, namely national pro-environmental attitudes (Section 5.2.2.1), kerbside collection infrastructure (Section 5.2.2.2), and Covid-19 influences (Section 5.2.2.3).

5.2.2.1 National Pro-Environmental Attitudes

The majority (84%) of Australian residents care about the environment and acknowledge that recycling has a major impact on the environment (IPSOS, 2016). Furthermore, 68% of residents admit to feeling guilty when they don’t put their waste into the right bins for recycling(Department of Water and Environmental Regulation, 2019). In more recent surveys, 92% of Australians believe recycling is important for the environment and 78% rate themselves as ‘good’ or ‘very good’ recyclers, believing they sort their waste into the appropriate bins (Cleanaway Waste Management Limited, 2022 p. 4). The above trends agree with resident responses to the importance of recycling practices, which have been described by survey agencies as ‘extremely heartening’, showing that in general Australians want to do the right thing (Cleanaway Waste Management Limited, 2021 p. 3). In this context, expert responses to whether recycling is a social convention widely affirm the aforementioned survey finding that recycling is a “social norm being part of household routines” (SG-004).

In their study of Victoria and NSW, Agarwal et al (2020) show that communities with a higher socio-economic index value tend to have a stronger identification with recycling as a social norm, appreciating the practice more. The authors also find a common trend of increased validation of recycling in areas with a higher socio-economic index across the nation. This viewpoint resonates with expert opinions in the wider Australian context as Australia is “an affluent, well-educated country, that has an obligation to be leaders [in sustainability] globally” (Inf-011). Practitioners reported “doing the right thing makes people feel good” (Inf-030), that it is an “intrinsic motivator” to recycle (Ind-021), and that recycling triggers a “rewarding feeling” (LG-003) with “sustainability becoming core value” (LG-009). These expert quotes indicate a perception that there is an emerging high regard for recycling and an expectation that it is viewed as an inherent part of the Australian culture. This is further discussed in the context of SPT in Chapter 6.

5.2.2.2 Comprehensive Kerbside Collection Infrastructure

Australian metropolitan areas offer a good coverage of kerbside recycling services with co-mingled bins implemented to simplify the practice. This provision of sufficient materiality is a driver to kerbside recycling, with Inf-033 (who has over 25 years of experience in conducting MSW bin audits) noting that “when recycling bins got introduced in the 1990s it was a sheer revolution”. She further explains that “people embraced the opportunity to do something good for the environment, by performing an easy practice”. Most interviewees (28 out of 37) expressed no doubt that acceptance and motivation to recycle is high, with most residents making use of the kerbside recycling system:

> *“Because the facilities are available through local government, the systems are available, it's easy to integrate into our lives. And it's over the last 10-15 years that recycling just became part of the way that households run. Not to recycle is negligent, and a bit of a faux pas these days because it's so easy” (Inf-011).*

The findings indicate that the moral norm to recycle is well-established amongst communities, making it is a relevant driver for undertaking recycling practices. However, as outlined in Chapter 2, the appeal to moral norms is most effective at the

early stages of a system's implementation and has reduced efficacy when the system is already well established and the practice is easy to follow (Miliute-Plepiene et al., 2016). Therefore, building on moral norms to improve kerbside recycling practices within the well-established kerbside system might be less effective than capitalising on moral norms within newly implemented systems, such as in the case of CDSs in several jurisdictions.

5.2.2.3 Covid-19 Influences

Since the pandemic, increased importance has been given to improving resource recovery (Cleanaway Waste Management Limited, 2022) and developing other domestic sustainable practices (Lindsay et al., 2022). Although the pandemic imposed many challenges to the entire global population, it also offered many people time to reflect and reset upon daily behaviours due to governmental restrictions. The latest National Recycling Report conducted by Cleanaway reveals that being exposed to restrictions and being bound to the local environment has improved the way people think about the environment. The national data reveals that due to the pandemic 41% of residents are more concerned about the environment, 44% desired to implement more sustainable practices in their life and 33% specifically re-evaluate their approach to recycling (Cleanaway Waste Management Limited, 2022, p. 12). Furthermore, many residents adopted new sustainable practices such as shopping for Australian-made products (15%)[36], participating in recycling schemes (13%), or avoiding single-use plastic (10%) during the pandemic with strong intentions to maintain such practices (51%) (Cleanaway Waste Management Limited, 2022).

The above data is corroborated by the interviews, who overall, indicate that residents' attitudes to recycling and other environmental practices strengthened as a result of increased respect for the local environment during lockdowns. Specifically, state government public servants and waste influencers explain that this happened during times when residents "want to be healthy including living in a healthy environment"

[36] In the Cleanaway (2022, p.7) report, 77% of participants stated a preference to "shop locally and seek out Australian-made products".

(Inf-027). Two LG informants report that noticeably more time was required to respond to community needs regarding environmental topics (LG-003; LG-023). These findings from Phases 1 and 2 echo other international Covid-19 research. For example, Beasy and Gonzalez (2021, p. 5) assert that “the COVID-19 pandemic and its effects on individuals and societies have altered [“lifted”] perceptions and practices of sustainability through envisaging previously unimaginable global environmental restoration, and experiencing personal, professional and collective changes”. Residents’ increased validation of the local environment, including perceived willingness to take further steps to protect the environment and improve their practices, is therefore a valid finding. In the context of these trends, experts state that it is “important from a behaviour change perspective that we've got to leverage that [new development]” (SG-034). This is further discussed in Chapter 6.

5.2.3 Barriers to Kerbside Recycling

Key barriers to kerbside recycling include variance in kerbside system standards (Section 5.2.3.1), leading to varying waste education (Section 5.2.3.2), and a subsequent lack of accurate sorting skills (Section 5.2.3.3). Further core barriers identified are complex packaging (Section 5.2.3.4), spatial limits at multi-unit dwellings (MUDs) (Section 5.2.3.5), low accountability at MUDs (Section 5.2.3.6), and a lack of trust in the recycling system (Section 5.2.3.7).

5.2.3.1 Different Kerbside System Standards

Australia’s co-mingled household kerbside recycling system was not designed to optimise recycling behaviours, resulting in high levels of contamination and the loss of resources to landfill (Kaufman et al., 2020). In this context, the investigation of policy documents (Phase 1) demonstrates that a lack of national leadership in WARR allowed the emergence of an array of national and state-wide sorting technologies at MRFs, some manual and some automated (Department of the Environment and Energy, 2018). The variety of sorting systems at MRFs has led to a multitude of rules about which items can and cannot be sorted at each facility and subsequently which can or cannot be accepted in residents' kerbside bins. Studies recently commissioned by the federal government reveal that the inconsistency of recycling standards is one

of the main barriers to accurate at-home recycling, leading to high levels of contamination (Cleanaway Waste Management Limited, 2022; DAWE, 2020; Kaufman et al., 2020). Also, 60% of the 37 environmental practitioners interviewed in this study confirm that different rules based on varying technologies and standards cause confusion and hinder the improvement of recycling skills:

> *"Councils and states, have different coloured bins, some of them got 2 bins, some 3 or 4 bins, it's confusing, there isn't a national standard which leads to different education campaigns teaching different things e.g., do you leave the lids on? Do you wash items out? etc" (LG-009).*

As a result, the best intentions, or drivers, to recycle can be overwritten by inconsistent standards. In the context of solving this problem, interviewees point to the difficulty of actioning the suggestions of research institutions such as the CSIRO and governments to align technologies to enable nationally aligned education as this would involve "coordinating nationally for 60 odd MRFs, and 570[37] councils to have a combined collective process. This is the only way where we agree what is accepted before we start educating" (Inf-037). Alignment across states is thus far from straightforward. For example, in NSW a waste sector report notes that the differences in sorting technologies between LGs can be due to space considerations, the balance between recycling outcomes and other costs, or different community attitudes about separation of items (NSW Environment Protection Authority, 2019). This observation lends support to the assertion that in the context of aligning MRF and potentially other industry goals, it can be "hard to ensure that all local governments are following the state government waste strategy" (SG-019) especially when measures are not mandated. In this context, practitioners highlight that "no one likes mandating because that makes governments unpopular" (Inf-025) and although the federal government has significantly increased its oversight, "we are not doing enough in terms of the regulatory frameworks" (Inf-037).

[37] The current number following council amalgamations is 537 (12 April 2023) (Australian Local Government Association, 2023).

5.2.3.2 Varying Waste Education

Unaligned technologies and standards (as described above) have led to variations in which waste items are accepted at MRFs. This forces LGs to send varying messages about local recycling rules, contributing to a high level of confusion amongst residents (Kaufman et al., 2020). This confusion about how to practice recycling correctly due to inconsistent education is a barrier identified in all recycling related reports and studies investigated in Phase 1. For example, Cleanaway Waste Management Limited (2021) identifies that 29% of residents are confused about recycling practices due to a lack of clear instructions (32%). Within the next year, Cleanaway Waste Management Limited (2022) reports a further increase in the level of confusion to 34% due to a lack of clear instructions (38%). In this context, 54% of residents explicitly wish for clear and consistent information to increase the likelihood of improving their own practices (Cleanaway Waste Management Limited, 2022). This aligns with the strong intention formed during the pandemic to adopt more sustainable practices. Uncertainty about recycling rules and the lack of clear instructions has led many residents to turn away from relying on information provided by their LGs, such as flyers or prospects (24%). Instead, residents choose to conduct general online searches (42%) (Cleanaway Waste Management Limited, 2022), which — considering varying recycling rules amongst LGs — may subsequently add to the confusion.

The expert interview findings from Phase 2 resonate with the findings from the survey analysis in Phase 1 described above. As one interviewee observes, “community engagement, and educational messages change from local government to local government, from town to town, even within a local government” (LG-005). Hence, when people move location, they frequently face changing rules, which can lead to a situation where “people often think learning about recycling is just too hard, because it keeps changing, or they're telling me one thing, and then they're doing something else” (LG-005). Waste influencer Inf-025, who has over 30 years of industry experience, remarked: “We've maxed out on education, but there's plenty of examples where education hasn't made any difference at all”. Experts (more than 50%) align with the statement that “people want it to be easy. They don't really want to hear they have to clean things out. They don't want to think about too many rules” (LG-005). Varying waste education based on a range of rules appears to contribute significantly

to inefficient kerbside recycling practices, leading to a lack of sorting and separation skills. Consequently, experts emphasise the need to make the practice straightforward as “people’s behaviour is often governed by their initial framework” (LG-001) resulting in a sense of resistance to re-consider or re-think an established practice “because they'll stick to a routine that's comfortable and self-justify” (LG-001).

Various kerbside system standards lead to varying waste education, confusing residents and contributing to the problem of inefficient recycling practices. However, considering the strong pro-environmental attitudes Australians expressed through the surveys in Phase 1 and the perceptions of interviewees in Phase 2, echoing this view, this research supports the argument that “Australians have the right attitude and intentions, however, they aren’t always consistent with their recycling habits in practice” (Cleanaway Waste Management Limited, 2022, p. 5). Many Australians may not even be aware of the degree of their mistakes during waste sorting and what is required to overcome them (Kaufman et al., 2020).

5.2.3.3 Lack of Accurate Sorting Skills

This section drills deeper into the previously identified barrier of varying waste education leading to a lack of accurate waste sorting skills. The National Recycling Report 2021 indicates that correct waste sorting in Australia is a complex task with less than 2% of survey participants being able to identify and sort presented waste items into the right bin (Cleanaway Waste Management Limited, 2021). As described in Chapter 1, the problem of inaccurate sorting skills is two-sided, occurring at the yellow and red bin levels within the 2-bin kerbside system.

Misidentification of Recyclables as General Waste: The level of misidentification of some recyclables as general waste is greater than others. A behaviour change survey conducted by the WA government indicates that many recyclable non-plastic items (e.g., made from paper/cardboard, metals or glass) familiar to most residents are correctly disposed of in recycling bins (DWER, 2019). This finding concurs with Moloney and Doolan (2017), who find that non-plastic recyclable materials are often easy to classify as recyclable; however, plastics are more difficult to classify. For example, the misidentification of rigid plastics as general waste can be linked to

education programs that aim to increase rigid plastic recycling by promoting the term “rigid plastic containers”. This causes misidentification of more shapes of ridged plastic products (such as non-container rigid plastics) as general waste (Moloney & Doolan, 2017). According to the Recycling Behaviours Report, where uncertainty exists “27% of Australians admit they just put items in their general waste bin” (Cleanaway Waste Management Limited, 2022 p. 4). Faced with uncertainty and the need to exert extra effort to find out more about the recyclability of a product, one of the latest national Recycling Surveys reveals that 37% of residents do not want to make the effort to think about sorting soft and rigid plastics into two different bins (Cleanaway Waste Management Limited, 2021).

Misidentification of General Waste as Recyclables: A lot of general waste e.g., components of consumer packaging often get misidentified as recyclable material. 13 practitioners align with their opinion that “many packaging materials include many formats and structures” (Inf-037) with some non-recyclable items like tetra pack or coffee cups looking like recyclables, which “really frustrates people” (Inf-037). Furthermore, general myths circulating within communities appear to cause misidentification of general waste as recyclables, causing contamination in kerbside recycling (Agarwal et al, 2020). For example, misunderstandings exist around standard items like broken glass, aerosols, takeaway coffee cups, polystyrene, containers with food residue, food-stained cardboard/paper, and bubble wrap, which are regularly misplaced in the yellow bin (DWER, 2019). Furthermore, 47% of residents believe soft plastic can be recycled, when it should be placed into the general waste bin or taken to a soft-plastic collection point (Cleanaway Waste Management Limited, 2021).

The interview results indicate that there is still a lot of “confusion mostly around plastics as some types of plastics can and others cannot be recycled” (Inf-037). The co-mingled system itself, which allows various types of materials in the one bin, can encourage residents to believe “they can put anything in the bins and think it will be sorted” (Inf-016). LG public servants confirm that “a lot of the time we just assumed people knew what to put in which bin” (SG-009). But after the China Sword “research

showed residents just simply didn't know. They had no idea" (LG-005) to the point where "you'll get a certain number of people who absolutely believe they're doing the right thing by putting light bulbs and broken ceramics, and all kind of things in their recycling bin being sure somebody can recycle it somewhere" (SG-029). Another major problem contributing to contaminants in the kerbside recycling stream are bagged recyclables. The latest national survey demonstrates that 18% of surveyed residents unintentionally regularly contaminate their recycling stream by sealing their recyclables in a plastic bag (Cleanaway Waste Management Limited, 2022). The broad problem of the misidentification of general waste as recyclables can also be juxtaposed by comments comparing contamination in green and yellow kerbside recycling bins. For instance, one expert informant states that "[contamination] rates between FOGO and kerbside recycling can vary by 20% for [the] same resident in [the] same household. Sorting garden organics is just so simple, it probably can be summarised in one sentence" (LG-015).

There are cumulative reasons for residents' inability to clearly differentiate between recyclable and non-recyclable materials, including a range of considerations in relation to attitude, time, and space (Agarwal et al., 2020), all of which affect contamination rates and the loss of recyclables to landfill. In Chapter 6 such reasons are discussed in greater detail using SPT as an analytical lens.

5.2.3.4 Complex Packaging

Complex packaging requires residents to exert perceived 'extra effort' to correctly separate packaging components. Kerbside contamination is partly due to sub-optimal product design leading to manifold or complex packaging that makes it harder for residents to recycle correctly (CSIRO, 2021). This is corroborated by eight interview participants who note that "people can't be bothered to pull items apart" (Inf-037) because "it's got to be simple, it can't be too complex in how you do it" (SG-035). Experts note that "humans have this kind of personality where when it gets too complicated, they'd rather not be part of it" (Ind-031). The barrier of complex packaging has intensified due to the proliferation of new materials. Previously, as one practitioner observed, it was "simpler because it was all glass containers, it was only soft drink

containers, aluminium cans, steel cans, and paper and cardboard items" (Inf-033). This finding leads to the conclusion that the complexity of packaging itself is one core barrier to good recycling practices. The slow response rate to this barrier by industry and governments is underpinned by survey results showing that 56% of residents rank "clearer product labelling" (Cleanaway Waste Management Limited, 2022, p. 8) as the most important motivator to improve recycling behaviour. There is significant potential to strengthen this motivator, as the Department of Water and Environmental Regulation (DWER, 2019, p. 32-33) reports that only 44% of residents always or most of the time "check for information about where an item should be disposed of, when you are unsure" and that only 60% of this subset of residents always or most of the time try to "separate out products made up of, or packaged in, different materials. However, 21% rarely or never make the effort". This indicates cognitive effort and decision-making might be a barrier to performing correct recycling practice — especially in light of the rise in complex packaging.

In the context of packaging volumes and labelling, two more trends surfaced during the expert interviews that are closely related to the Covid-19 pandemic. 12 experts pointed to a peak in packaging waste generation and increased contamination within the recycling stream, noting that MSW "rates of waste and recycling domestically had increased" (LG-013), "with volumes risen by 20%" (Inf-027). This includes packaging "at different stages, [including] things like increase in cardboard and deliveries at home. So UberEATS and [online] shopping" (Inf-028). This is also confirmed by Australian news reports during the pandemic (Chang, 2021). Secondly, within the increased MSW stream "also the rates of contamination had increased" (LG-013). ARL experts (Int-016; Int-018; Int-027; Int-025) explained that increased contamination during Covid-19 was likely partly caused by the "fairly poor information on that sort of packaging" (Int-027) as the Australasian Recycling Logo[38] on B2B (online shopping

[38] The ARL can be classified as a practice element that can be linked to more than one practice element categories, as described in Chapter 3. In the context of kerbside recycling, it could be debated to classify the ARL as either meaning or competence element. In this study the ARL is classified as competence element due to its first purpose of providing consumers with information on how to recycle an item correctly.

packaging) and takeaway packaging is not considered under the EPR scheme for Plastics and Packaging. The latter trend is further discussed in Chapters 6 and 7.

5.2.3.5 Spatial Limits at Multi-Unit-Dwellings (MUDs)

The dwelling size of a household poses another barrier (Kaufman et al., 2020). Behaviour change research by the WA government reveals that Australian residents living in Multi-Unit-Dwellings (such as flats, units or apartments) have inadequate space and do not always source separate in the home. In this context 25% of survey participants indicate that they do not have dedicated areas for collecting recyclables in the home, and are subsequently less inclined to perform recycling practices (DWER, 2019). The architecture of urban dwellings can dictate different consumption practices, such as having to buy groceries in small amounts more frequently, storing less (Müller et al., 2022) or having less space for source separation at point of disposal (Timlett & Williams, 2011). In the Australian context, higher contamination rates and increased loss of resources to landfill at MUDs (Agarwal et al., 2020) can be at least partially attributed to this lack of space.

5.2.3.6 Low Accountability at Multi-Unit-Dwellings (MUDs)

According to IPSOS (2016), MUD residents often show little motivation to change their individual systems and practices. A total of eight interviewees identify the lack of space in external bin areas that can lead to overflowing bins as a factor that leads to a low accountability of MUD residents regarding good kerbside recycling practice. Two practitioners associated overflowing bins with a loss of confidence: “when you go to the shared bin sections and it's already contaminated people lose confidence and question what is the point?” (LG-015). The same LG public servant observed that even if the bins are not overflowing, “anonymous shared space makes it difficult to hold people accountable [for the right source separation] and therefore often leads to attitudes reflecting low level of care” (LG-015). LG-005 adds to this: “even if you do care about recycling, and then you go down and it's already contaminated or it's already out of your control what's the point of me being all clean and sorting it out when it's just as bad”. Recycling surveys such as Agarwal et al (2020) confirm the low accountability that comes with using communal bins, reasoning that it discourages

residents from practicing correct recycling behaviours. For example, Agarwal et al. (2020) note that many shared bin areas at MUDs provide insufficient kerbside frontage space, which can lead to overflowing bins, tempting residents to just drop everything into any available bin without feeling any accountability for failing to apply the rules. While LG public servants state that they are keenly aware of the waste management issues at MUDs and have consulted about it, no adequate solution has yet been found: “I've talked to so many councils and asked if they have got a good program for MUDs. But I haven't found one yet” (LG-006).

5.2.3.7 Lack of Trust in the Recycling System

The National Recycling Report reveals two years after the 2018 China ban 39% of residents lack trust in the recycling system (Cleanaway Waste Management Limited, 2021, p. 4). China’s export ban caused local constraints on how to manage our yellow bin recyclables, causing a significant industry spotlight. National television and education programs such as *War on Waste* uncovered a range of industry problems (Kaufman et al., 2020). The ban and its immediate consequences had a noticeable impact on residents’ recycling behaviours. For example, behaviour change specialist[39] Rachel McIntyre stated in an interview with the industry magazine *Inside Waste* that “I felt that the China Sword undid 20 years’ worth of recycling education in many respects” (Inside Waste, 2021). Due to the media pointing to the absence of a local industry landscape to reprocess and remanufacture recycled materials after China’s ban, the widespread assumption across the Australian population is that materials are generally taken to landfill (Wheeler, 2021a). Australia does have some onshore recycling infrastructure for glass, aluminium, and paper, and therefore this assumption is not entirely accurate. However, a year after the China Sword, 56% of residents “strongly disagree, disagree or neither agree nor disagree” that recyclable materials put in the recycling bin actually get recycled(Department of Water and Environmental Regulation, 2019). These results are confirmed by O'Dwyer et al. (2022, p. 14) who state that “there is noticeable distrust of waste management practices in Australia, with

[39] Rachel McIntyre works with LGs and businesses to provide education, technical, and training services within the WARR sector across metropolitan and regional areas.

an average score of 4.8 [out of 10] in response to 'Australia has good waste management practices'". O'Dwyer et al. (2022) suggest that this 'distrust' is the result of recent media attention and is a core barrier to good household recycling practices.

The interview findings in Phase 2 echo the above outcomes from the Phase 1 document analysis, with a quarter of practitioners confirming that a negative industry image in the media has created a lack of trust in the Australian WARR system. Before giving examples in support of this statement, it should be acknowledged that interviewees also reported a positive impact of media on environmental topics in recent years. However, in the context of recycling, the media is predominantly seen as a barrier to good practice due to creating "dodgy sort of bad publicity around recycling that made people lose faith in the actual activity itself" (LG-003) and "dodgy recyclers becoming an urban myth" (SG-035). With the WARR industry put on the spot, mindsets such as "it just goes to landfill anyway" flourished (LG-001), causing an increased questioning of the need to recycle. Also, half of the interviewed LG public servants confirm that many residents "do not know why crunching materials in a ball or flattening cardboard or removing the lid is important, as the downstream processes had not been made transparent" (LG-005). This aligns with survey results confirming many residents wish for a better understanding of the recycling system (Cleanaway Waste Management Limited, 2022). Hence, interviewees argue that it is necessary to re-establish the "trust that it [recycling] is worth the effort" (LG-003) to erase "the one-off bad stories" (SG-004) that linger in people's minds as "the message is so easy for people to believe" (LG-023), which makes it hard to shift the "undermined confidence in the system" (Ind-031). Furthermore, any efforts to communicate pro-environmental messages are "less likely to be effective if you don't have the infrastructure in place to show it doesn't go to landfill" (SG-029). Two interviewees also pointed to the fact that "community research around environmental behaviours shows if people understand that what they are doing has value they'll do it more" (SG-035). Moreover, the strong historical reliance on waste exports has led to the development of campaigns with a narrow focus. As one interviewee observed, "campaigns seem to focus a lot on bin separation. I think there's a bit of a missed opportunity in terms of explaining the why" (SG-029). The interview results outlined above confirm that much work remains to be done, including "finding new and innovative ways to look at waste" (LG-003) and

“looking at our bins as the last resort, rather than the solution” (SG-004). Currently, “there's no such thing as a way people think about waste as a resource” (Inf-011).

Table 5.1 summarises the core barriers to household kerbside recycling and clusters them into practice element categories.

Material Elements		Competence Elements		Meaning Elements
Different Kerbside System Standards		Varying Waste Education		Confusion
Complex Packaging		Australasian Recycling Logo		Extra Effort
Spatial Barriers at MUDs		Lack of Accurate Sorting and Separation Skills		Lack of Accountability
Underdeveloped Onshore Industry Landscape				Lack of Trust in the System

Table 5.1: Core Barriers to Household Kerbside Recycling from a Resident Survey and Expert Informants Perspective.

The following section outlines the policy interventions and practical measures proposed by environmental practitioners, engaged in Phase 2 of this study, to enhance the quality and quantity of kerbside recycled materials.

5.3 Enhancing Kerbside Recycling

Akin to Section 5.2, this section presents findings from the Phase 1 document analysis of national WARR policy and strategy and the Phase 2 content analysis of 37 expert interviews. This section specifically analyses policy frameworks (Section 5.3.1) and practical measures (Section 5.3.2) to enhance kerbside recycling practices.

5.3.1 Policy Interventions to Improve Kerbside Recycling

The analysis of WARR national policy and state-based strategy documents includes but is not limited to the National Waste Policy 2018 (NWP) and National Waste Policy

Action Plan 2019 (NWPAP), and the NSW and WA environmental state strategies[40]. The document analysis specifically investigates guiding strategies and systems that federal and state governments have developed in connection to household kerbside recycling. Three key themes are identified, namely recycling infrastructure (Section 5.3.1.1), education (Section 5.3.1.2), and residents' validation of waste as a resource (Section 5.3.1.3). Overall, the two state-based strategies (NSW and WA) follow the major themes identified at national level.

5.3.1.1 Infrastructure

This section describes three directions in the context of materiality outlined by the federal, NSW, and WA governments to improve household kerbside recycling practices and rates. These directions are the alignment of kerbside system standards, the Australasian Recycling Label (ARL), and food organics and garden organics (FOGO) recycling.

Aligning Kerbside System Standards: Due to inconsistency across recycling systems, barriers such as varying education, confusion, and a lack of sorting skills reduce the efficiency of kerbside recycling. As a result, the federal government pledged it essential to develop a common approach "towards waste policy and regulation" (Commonwealth of Australia, 2018, p. 14) including "considering national standards for kerbside recycling collection and materials recovery facilities to improve consistency and performance" (Australian Government, 2019, p. 13) with progress to be made by 2022. To meet this goal the federal government tasked the CSIRO (2021) to develop a national roadmap for recyclable materials and recycling systems. The CSIRO (2021) report indicates the need to upgrade and align MRF technology; to align contractual arrangements between collectors, LGs, and MRF operators; and to improve data collection methods and the quality of collected materials. The CSIRO further asserts that aligned system standards can help to retain more valuable material by reducing resident confusion about what goes in which bin, and increase economies of scale of MRFs (Australian Government, 2022; CSIRO, 2021). However, the 2021

[40] Refer to Chapter 4 for the full list of documents investigated in this thesis.

Progress Report and the latest National Waste Report do not mention any progress towards this target (DCCEEW, 2021b, 2022). Critics such as Agarwal et al. (2020) note that there is scant information about state-based and national progress on the topic, confirming that there are still no mandated recycling standards at the national level. Thus, state and territory governments are largely responsible for recycling policies, systems, and standards. As such, barriers such as nationally unaligned collection and sorting have not been addressed.

State and territory governments such as NSW recognise the inconsistency of recycling systems as a barrier and support technology alignment as an opportunity to improve kerbside recycling outcomes (NSW Government, 2020). It is acknowledged that "consistency in the provision of kerbside services to households in urbanised areas … { } [can] improve messaging to the community … { } … leading to better practice outcomes across large urbanised populations (Waste Authority, 2019). For example, the WA government links consistent collection services to opportunities to create a system that aims for "consistent collection [which] also provides opportunities for service providers to establish processing options for clean and consistent streams of materials, which can reduce costs and improve product quality and therefore access to markets" (Government of Western Australia, 2020 p. 30). Similarly in NSW an explicit goal is to align collection services and increase processing capacity (Department of Planning Industry and Environment, 2021). However, there is a significant number of different service providers in a variety of LG areas. Combined with increasing population and thus waste generation, there is a certain degree of environmental and commercial complexity, posing a potential impediment to achieving such goals (DPIE, 2021). Therefore, NSW invested in an initiative to align kerbside services on a LG level by fostering collaboration as part of a cooperative body. An example in NSW is the Southern Sydney Regional Organisation of Councils (SSROC) including 11 LGs spanning Sydney's southern, eastern, central, and inner west suburbs working together to align approaches, combine volumes, and reduce costs (SSROC, 2022). The NSW state government recently accelerated the ability for further LG collaborations by investing $16 million to commence a new service platform to make it easier for LGs to jointly procure waste services. The joint procurement facilitation service is slated to commence from July 2022. Past this date no information

about the progress of the initiative has yet been made publicly available. In response to an e-mail request of the researcher made in June 2023 about the progress of the initiative a NSW EPA public servant stated “we are currently developing the service and will be releasing more information soon”. Following the alignment of procurement services improving recycling skill should also be supported by a state-wide behaviour change campaign “that will help households adjust to the changes and improve their recycling habits” (Department of Planning Industry and Environment, 2021). However, at this point it should be mentioned that – once developed and released - it will be voluntary for councils to participate in the service platform (EPA NSW, 2022b). Therefore, and due to the delay of the service its impact on household kerbside recycling practices is unknown at this point in the research.

Australasian Recycling Label (ARL): A broad outline of the purpose, regulations and goals of the ARL initiative are provided in Chapter 2. Phase 1 document analysis indicates that the promotion of the label is underpinned by two national sub-targets to be achieved by 2025. Firstly, “all Australia’s packaging [is] being [made] reusable, recyclable or compostable” and secondly, 50% of “average recycled content [is contained] across all packaging” by 2025 (Australian Government, 2019, p. 10). As of May 2023, the first sub-target has resulted in an 86% recoverability rate of all supermarket packaging (APCO, 2023). In the context of the second sub-target, it is unclear how many types of Australian consumer packaging display the percentage of recycled content they include. Furthermore, the progress on making more consumer packaging from recycled content has not been made transparent since 2018-2019, when the average level of recycled content in packaging was 38%[41] (APCO, 2021). The federal government acknowledges that more “research to better understand business barriers” (Australian Government, 2019, p. 29) to purchasing products made from recycled packaging is needed to create a demand for products made from recycled content. However, at the consumer level, the NWPAP does not mention research action in the context of: a) how to promote the purchase of recycled packaging or b) how to embed environmental issues into residents’ purchasing

[41] This is predominantly caused by “a shortage of infrastructure for secondary processing of waste and remanufacturing of products with recycled content” (Midwaste, 2019, p. 3).

decisions. This points to a research gap regarding the policy process of expanding the ARL and promoting additional information about recycled content in consumer packaging.

During Phase 2, experts gave further insights about the application and effectiveness of the ARL initiative. Two interviewees (Inf-016; Inf-030) pointed to the fact that the ARL was implemented as a national guide for consumers to correctly dispose of complex packaging such as “satchels, trays, and all those different types of packaging on the market” (Inf-030) at home. However, interview results confirm that the use of the logo imposes major challenges for residents. It should be noted that a small minority of practitioners think that “all people must do, is to look at the packaging, it will give you a symbol for the bottle, the cap, the tray, the lid, the sling” and the coordinated messaging “on the website where you can learn all about it” (Inf-030). This and the catchy campaign slogan “check it before you chuck it” (Inf-016) are meant to be a motivator to adopt new practices involving checking the logo. However, five interviewees pointed to three major problems. Firstly, the promotion of the label through APCO’s campaigning relies on “information on ‘how to’ rather than emotions and the ‘why’” (Inf-037). Secondly, the complexity of the design of the label itself has impacted comprehension, and thus uptake of the new habit is slow. Resistance seems mostly caused by a feeling of being overwhelmed because “it seems so much to learn, and I'm always in a rush” (Inf-011). Thus, the adoption of the targeted practice ends up in the “too hard basket” (LG-014). This is confirmed by an audit undertaken in 2020 by the *Sydney Morning Herald* that found that rather than providing clarification, the label has generated more confusion among consumers (Topsfield, 2021). Figure 5.1 presents the logo, its possible components, and their meaning.

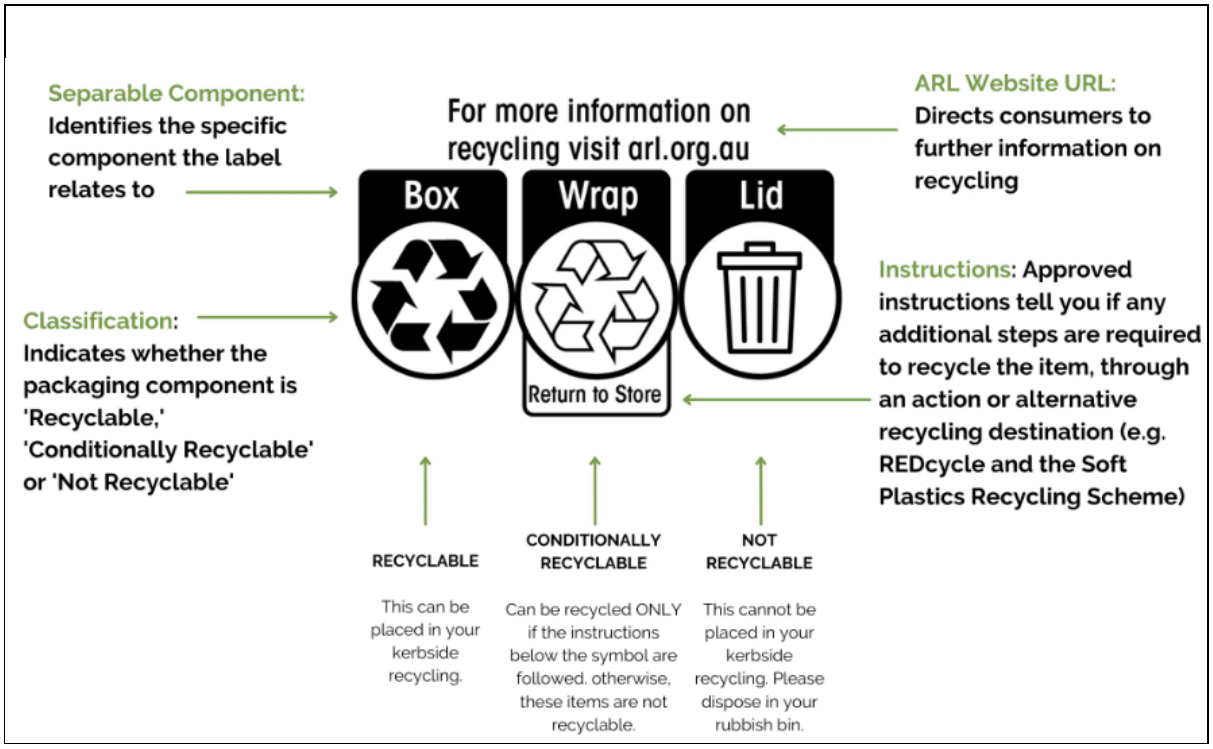


Figure 5.1: The Australasian Recycling Label (ARL). Source: Australian Packaging Covenant (2022).

Thirdly, pulling packaging apart isn't "a convenience thing"; for example, "you got a meat tray, and you have to pull it apart, and it's dirty and it's tedious" (Inf-030). In the context of this research such obstacles support the barrier identified in the previous section, namely the need to exert 'extra effort'.

Introduction of FOGO to Address Underperforming Kerbside Recycling Rates: At both federal and WA and NSW state policy level, the introduction of a standard 3-bin system is recommended. Additional source separation can reduce the amount of waste going to landfill, increase the underperforming state-wide MSW recycling rates (both NSW and WA are under 50% (Waste Authority, 2019; NSW Government, 2020) by collecting organic materials for composting, and therefore help to achieve the ambitious national goal of 80% resource recovery (The Australian Government, 2019). Therefore, one headline strategy of both states is to expand the 2-bin collection system (general waste (red) and recycling (yellow)) by adding an additional bin (green) for the collection of food and garden organics (FOGO) across metropolitan areas (i.e., the 3-bin collection

system). In most metropolitan areas, the provision of garden organics (GO) bins[42] is already widespread. In 2020/21 48% of Australians had access to GO collection services, compared to 31% of Australian residents that could access FOGO (Blue Environment, 2022).

Although it is not entirely clear from the analysis if FOGO services will be mandated across states or not[43], NSW and WA have set clear commitments to supply the service to at least all metropolitan households (e.g., NSW by 2030[44]) through investing $65 million over five years from the financial year 2022-23 for the implementation of this service, including "the rollout of new collection services, the development of more processing capacity, and a state-wide education campaign that will help households adjust to the changes and improve their recycling habits" (DPIE, 2021, p. 26). Part of the education campaign includes information on the opportunity for "donation of surplus food to food rescue organisations to minimise food waste and the resulting emissions that would otherwise be generated from this waste if it was landfilled" (DPIE, 2021, p. 26). A recent study shows that the 3-bin collection system can significantly improve MSW recovery rates, reduce carbon emissions, and decrease contamination in recycling bins, both in Australian jurisdictions and globally (Waste Authority of Western Australia, 2020). However, as a barrier to a smooth transition to the new service, the NSW government, for example, acknowledges the challenges of "managing the different needs of high-density housing" (DPIE, 2021, p. 25). These

[42] In the context of this research, the provision of GO bins is unlikely to impact home kerbside practices, as garden organics are typically not collected in the home. FOGO bins are likely to make an impact because food organics are produced in the home.

[43] In the NSW Waste and Sustainable Materials Strategy 2041 (Stage 1: 2021-2027) released in 2021, the government "assumes mandatory FOGO for households in the levy area and mandatory food collection for select businesses" (p. 20).

[44] In WA the aim by 2025 is that "all local governments in the Perth and Peel region provide consistent three bin kerbside collection systems that include separation of FOGO from other waste categories" (Waste Authority, 2019, p. 29-30), with the government acknowledging that "consistent systems, including three bin food organics and garden organics (FOGO) systems, can improve messaging to the community about how to recycle effectively and lead to better practice outcomes across large, urbanised populations".

challenges are not further specified in the document. This author assumes the quote is closely related to different space and physical arrangements at different dwelling types such as SUDs and MUDs, an issue identified in Chapter 3 (Briguglio, 2016). Expert informants also acknowledge the potential of further waste separation at bin level as a driver to reduce contamination and increase resource recovery rates e.g., by introducing a 3-bin system: “If council offers, a FOGO service, as well as the recycling and the landfill service that opens new opportunities on how people sort their rubbish from home completely differently. If you don't offer three bins, and if you're recycling is full, everything goes to landfill” (LG-005). Therefore, “3-bin systems, even though there is more to do, make source separation more effective” (LG-014).

5.3.1.2 Education

This section describes key directions of Australian environmental education outlined by the federal, NSW, and WA governments to build and strengthen competencies to improve household kerbside recycling practices and rates. These directions include the alignment of education, the improvement of data and reporting, and the purchase of Australian recycled products.

Align Education: To improve household kerbside recycling competencies and skills, federal and state government policy and strategies are generally aligned regarding the need to “align community education efforts to maximise impact and reduce confusion” (Australian Government, 2019, p. 11). In Phase 2 of this study, many experts implicitly supported this goal, going as far as actively advocating for national and state-based changes in the context of “getting a common kerbside collection system across the states” (Inf-026) to align campaigns and move away from the current piecemeal approach. In their environmental strategy document, WA affirms national directions outlining the need for the alignment of recycling rules and endorses the prioritisation of consistent communication amongst LGs (Waste Authority, 2019). In this context, WA is the first amongst the Australian states and territories to align household kerbside recycling rules and education in 2022. This was achieved by MRF operators collectively agreeing on recyclable materials and items accepted in the kerbside recycling bin. A publicly available ‘A to Z’ list (Macgill, Hay, Eustance, & Gray, 2019)

outlines the “over 250 items — allowing educators to align information as much as possible in terms of the messaging around waste” (LG-018). The list serves as “one source of information created amongst local governments” (SG-004) and enables the design of “national education programs including consistent messaging” (Inf-027; Inf-028). However, in practice “many residents won’t open the A-Z list or download the state's recycling app[45]” (LG-023) to seek information, thus lending support to the view that even though rules are aligned, “when it is overwhelming, creates questions or extra effort the battle is already lost” (Ind-024).

A second example to align education also comes from WA, where the Strategy Action Plan gives focused attention to “maintain a communications toolkit for local government on consistent messaging for better practice kerbside service delivery”[46] and “develop education and engagement resources to communicate the benefits of resource recovery and the use of recycled products, and to minimise contamination in collection systems” (Waste Authority, p. 31). The state specifically points to a need for stronger and “consistent messaging across homes, workplaces and public areas” (Waste Authority, 2019 p. 5). Communication is predominantly meant to be led by LGs, including informing communities about the impact their decisions can have on the environment, to encourage the adoption of better waste practices. At a higher level, the WA Waste Avoidance and Resource Recovery Strategy 2030 affirms that it is not only the promotion of correct kerbside recycling information that is important but also teaching communities to manage resources in a circular manner from extraction through to use, recycling, and reprocessing (Government of Western Australia, 2020d).

[45] The WA recycling app Recycle Right includes all items on the A-Z list (Recycle Right, 2022).

[46] The toolkit was developed “including research and stakeholder consultation, to identify and address problematic waste behaviours. The campaign aims to reframe waste as a problem that we can solve, promote high-level waste sorting behaviours and normalise the concept that landfill is the last resort” (Government of Western Australia, 2020b, p. 1).

Improve Data and Reporting: On an institutional level, improving data and reporting is an essential requirement for understanding issues such as contamination. Poor reporting of waste data has been an issue since the publication of the first National Waste Report in 2010 due the lack of alignment of industry and policy parameters on national, state, and local government levels (Commonwealth of Australia, 2018b). In the context of this research, poor data is particularly related to confusing terminologies and information gaps in relation to waste compositions, and the source and end destination of waste. In order to develop targeted strategies to achieve more informed decisions at all levels of society, the federal government aims "to improve sharing of information" (Australian Government, 2019 p. 14) since "high quality information on flows of resources and material, and markets for recycled materials and products is critical" (Commonwealth of Australia, 2018 p. 16). According to Australia's multi-level governance structure, the responsibility for delivering quality data rests on all state governments (and waste businesses), with a timeline proposed by the Federal Government of 2022 (Australian Government, 2019). State governments such as NSW have implemented state-based databases (the database is called NSW Waste Performance Data) (NSW Environment Protection Authority, 2022b) for data collection and sharing of information, supported nationally by building a transparent national database for centralisation of information (National Waste Account) (Australian Bureau of Statistics, 2020). Given this "harmonisation of data classifications and definitions for reporting, and sharing arrangements across jurisdictions" was to supposed to be achieved by 2022 (Australian Government, 2019 p. 29) progress is not transparent (Department of Climate Change Energy the Environment and Water, 2021). By the end of 2022, this national database was not yet available and the information on state databases is not yet aligned. Interviewees point to the demand for improved waste data, which demonstrates that the federal government's goal has not yet been fully implemented. LG public servants, in particular, point to a lack of accurate local data that should be the foundation for planning environmental campaigning. Ideally "household campaigns start with getting that baseline data for example via waste audit to understand waste compositions" (LG-005). This can be done at individual bin level (street audit) or at community level (MRF audit) to assess behaviours. Another option is "conducting surveys and talking to community to understand what they're doing and to getting an overarching understanding of what the community wants" (LG-005). LG public servants indicate such measures are

applied in selected areas, but not consistently, largely due to a lack of financial or human resources. Therefore, working out where to collect in depth data as the foundation for educational efforts across states, territories, and their respective LGs is vital, as “problems are diverse and not every educational effort that works in one area will work in another” (LG-015).

Purchase of Australian Recycled Products: The federal government acknowledges the need to develop markets for recycled materials - ‘Commercialising Recycled Materials’ (The Australian Government, 2019). B2C market opportunities for recycled products are directly linked to residents' consumption behaviours, as “individuals in Australia [should] take environmental issues into account when purchasing […] goods and services, and promote domestic demand for recycled materials and products containing recycled content” (Commonwealth of Australia, 2018 p. 15). To allow more informed consumer choices, one innovation proposed in the NWPAP is to “incorporate information about the percentage of recycled content in packaging into the Australasian Recycling Label (ARL) by 2021" (Australian Government, 2019, p 19). This measure is underpinned by positive results from a behaviour change survey conducted by the WA government that finds 45% of participants have the desire (always or most of the time) to “choose to buy recycled products/packaging” (Department of Water and Environmental Regulation, 2019). This aligns with international studies such as Polyportis et al (2022, p.1), who find that “consumers have a positive attitude towards [all] products made from recycled materials”. Products/packaging made of recycled content can have a positive impact on the meaning element of practices (Shove et al., 2012), influencing sustainable purchasing decisions. However, to the best of the author's knowledge, there is currently no research on the effect of packaging made from recycled materials on recycling behaviour. This is further discussed in Chapter 7.

Several interviewees recall the national push for Australian-made products with “people really wanting, Australia made things” (LG-005) and suggesting a similar approach for Australian recycled packaging. The purchase of Australian recycled packaging is not directly linked to the research problem of underperforming recycling

rates; however, targeting consumption practices, and promoting the purchase of recycled products may open doors for the promotion of better recycling practices, especially the need for clean material streams to be reprocessed to high quality recycled goods (e.g., recycled water bottles). In this context the federal government has started to take small actions by recognising the link between recycling behaviours and the production of goods from recycled materials. For example, the ReMade campaign was launched in 2021 “to encourage Australians to better recycle by showing how recycled materials can be recirculated in the economy” (DCCEEW, 2021b, p. 8). State government public servant SG-004 supports the approach to emphasise the links of one’s everyday actions, observing “we should keep in mind that behaviour change has multiple factors that you can use to influence, and not all of them have to even relate to waste”. In this context, several interviewees emphasise linking our small daily practices to the bigger picture to improve global environmental problems such as climate change. This is important as “people walk away from issues that are out of their control” (LG-001). Therefore, local government public servant (LG-001) adds: “So, we need to link what's in their control to the big picture to make residents understand why they should be participating”. Such an approach could encourage residents to take more ownership in their recycling behaviour. This topic is further discussed in Chapter 7.

5.3.1.3 Value

This section describes key perceptions of value outlined by the federal, NSW, and WA governments. At the national level, the federal guiding documents address the importance of creating collective meaning. At the time of the establishment of national policy in 2018, the federal government anticipated that there would be a “growing desire to see our resources recaptured and recirculated within our economy” (Commonwealth of Australia, 2018, p. 5). However, the NWP also emphasises the need for aspirations to be linked to a broader meaning to restore “confidence in Australian resource management” (Commonwealth of Australia, 2018a, p. 7), which can be achieved by building local markets and “new ways of thinking about waste” within the population (Commonwealth of Australia, 2018, p. 11). This aligns with the barrier posed by a lack of trust in the recycling system, emphasising the need to

improve the underdeveloped local industry landscape to restore residents' confidence in recycling.

At state level, the document analysis indicates that NSW and WA follow the national approach, clearly emphasising the importance of changing mindsets towards circular thinking and harnessing recyclables as valuable resources. However, the states approach this goal from different angles. According to the Waste Authority (2019, p. 33), in WA residents need to do a lot more ground work to achieve a feeling of collective responsibility to counter “adverse waste behaviours”. This is also shown by the frequent use of the word “recycling” in the WA strategy (45 times) (Waste Authority, 2019). Counting priority words such as ‘recycling’ within qualitative datasets is related to a summative content analysis approach (Hsieh & Shannon, 2005). This is not a focus of the analysis in this thesis; however, in the context of how the research problem is situated in WA, the significant word count provides further evidence of the low prioritisation of the practice in the past, especially as the key word is often combined with other key words such as confident, important, focus, benefits, compliance, arrangements, targets, and directions, with governments identifying “significant opportunities to improve our waste and recycling practices and performance” (Waste Authority, 2019 p. 7). The WA government places the validation of waste as a resource on an equal foothold with infrastructure and education, as it is “as important as the provision of physical infrastructure and collection systems” (Waste Authority, 2019 p. 5) and community engagement and awareness. In contrast, the NSW strategy is self-congratulatory, suggesting that the state has “led the way” […] “in how citizens, businesses, and councils avoid, reduce, reuse, recycle and safely dispose of waste” (NSW DPIE, 2021, p. 10). This is contradictory to the current underperforming recycling rates in NSW, which situate NSW as a mid-tier performer in terms of resource recovery in the household domain (Inside Waste, 2018). Importantly, both WA and NSW acknowledge that actions must be taken immediately and in a sustained manner.

5.3.2 Practical Measures to Improve Household Kerbside Recycling

This section discusses practical measures proposed by expert informants during the Phase 2 interviews to improve household kerbside recycling. Five key practical

measures are identified, namely education tools (Section 5.3.2.1), educating the educator (Section 5.3.2.2), community connectors (Section 5.3.2.3), bin tagging (Section 5.3.2.4), and a multi-sectoral approach (Section 5.3.2.5).

5.3.2.1 Education Tools

When asked about practical education tools and concepts applied to improve kerbside recycling practices, interviewees pointed to three major findings. Firstly, most educators apply standard communication tools (e.g., signage or website content) to convey simple recycling messages. Secondly, while some interviewees discuss more advanced behaviour change concepts, the practical application and deeper theoretical understanding of such concepts in Australian environmental education appears to be sparse. Thirdly, educational messages generally lack an explanation of the rationale for an environmental practice.

Appendix F presents the collection of communication tools (Appendix Table F1) and practical behaviour change concepts (Appendix Table F2) suggested by interviewees during Phase 2. Regarding communication tools, social media is viewed as the most powerful tool for the transmission of messages. Most interviewees agree that messages “should be easy, consistent and catchy” (Inf-016). However, research about contamination in kerbside recycling recently conducted by the federal government, synthesised from the available evidence from literature and experts, indicates that traditional information campaigns are only moderately effective (Kaufman et al., 2020). Regarding practical behaviour change concepts, interviewees identify peer pressure, intergenerational equity, and positive reinforcement (Appendix Table F2). The literature suggests that it is necessary to focus on meanings and social norms to more effectively trigger emotional responses (Kaufman et al., 2020). Experts acknowledge the importance of applying advanced behaviour change concepts in environmental education; however, over ten interviewees report that in practice due to a perceived lack of experience, human, and/or financial resources the application of advanced behaviour change concepts is not the standard. For example, a LG public servant from WA points to a limitation of the state’s environmental education communication toolkit when it comes to proving an explanation (‘missing the why’) to residents for the rationale of applying household kerbside recycling practices:

> *“When you're dealing with a demographic like ours, which is educated, and basically wealthy and includes most people that speak English as a first language we do have to tweak it [the tools provided in the toolkit] a bit to apply education that goes beyond the bins” (LG-029).*

Further interviewees add to this perception, noting that “most of the messaging has been about the how to and what to put in what bin but not the why” (LG-030). It is considered important to explain the rules; however, in some areas it is also essential to bring the “motivation piece in, like why doing it and what is it [recyclables] going to be turned into is important” (SG-031).

Interviewees emphasise that understanding the ‘why’ is essential to help people understand that their individual effort matters and that the recyclable material they collect can be turned into new products, thereby mitigating the lack of trust in the system. Existing tools and educational messages in the context of Australian household kerbside recycling education seem to lack the understanding of ‘why am I doing this?’. The WA Waste Avoidance and Resource Recovery Strategy 2030 affirms that it is not only the promotion of correct kerbside recycling information that is important but also teaching communities to manage resources in a circular manner from extraction through to use, recycling, and reprocessing (Government of Western Australia, 2020d).

The latest National Recycling Report reveals a strong wish among residents (46%) for a “better understanding of how recycling is done” wherein “knowing where their recycling goes and what happens to it would motivate to recycle more” (Cleanaway Waste Management Limited, 2022, pp. 4, 11). The desire to understand the downstream process leads to the impression that there is a genuine willingness among residents to minimise negative impacts on the environment. However, without building an industry landscape with the capacity to process residents' recycled materials locally, restoring residents' trust in the system and encouraging them to take greater responsibility for the better management of their waste imposes a significant challenge

for educators (Clean Energy Finance Corporation, 2021). Therefore, a lack of trust in the system is a significant barrier to household recycling practices.

5.3.2.2 Educate the Educator

Environmental practitioners acknowledge the importance of their own education as foundational to promoting better recycling practices within local communities. Access to education programs was restricted to a minority of interviewed experts; however, some had the opportunity to participate in programs such as the international scientific driven program for PEBC hosted by Doug McKenzie (SG-004; LG-001; LG-003; LG-013). Interviewee SG-029 notes that such programs are key, as “to be able to change behaviour, you've got to know very specifically, what is that one thing that's going to change the outcome”.

Due to an overall lack of education and research, some practitioners in their respective organisations are “really pushing for [getting access to] research driven and evidence-based programs” (SG-004). In the case of the Department of Water and Environmental Regulation (DWER) in WA, this push has led to “acknowledging the importance of behavioural science and using a behavioural scientist” (Inf-022) for their environmental program design. Furthermore, NSW, SA, and WA have implemented working groups that regularly bring their waste educators from SG and LG level together to “exchange information and new things to engage with” (LG-001). Some practitioners express the opinion that their “education programs got a lot cleverer in the last 10 or 15 years” (LG-009), building more confidence in their roles. There is a strong need for aligned waste education because “it is important that we're all saying the same thing” (Inf-011). However, in reality, “we [waste educators] are still not shifting much” (SG-035). While mindsets are slowly evolving, many LGs in Australia are still relying on standard approaches using “old fashioned methods to educate the public” (Ind-036).

5.3.2.3 Community Connectors

Community connectors are passionate residents recruited by LGs seeking to help improve community behaviours. Although described by multiple experts, only a small

number of LG practitioners (3) deliberately implement the concept to promote sustainable practices amongst communities. For example, experienced state government public servant SG-034 notes that community connectors work best in smaller communities as they are "easier to change". A LG in WA regularly takes about “20 people through a five-week education program becoming waste warriors in their community by being passionate spreading the knowledge” (LG-008). These community connectors can be recruited informally through community workshops or personal coaching that spark interest and passion for the environment. LG-008 notes that “one of the workshop participants was telling me last week that I inspired her, and she changed her behaviour. And now she's changing behaviours of others”, while Ind-024 indicates that if “you influence people, dedicated people who are going to champion it you get the broad rest of the population interested”.

One advantage of this approach is that information is coming from someone within their own community, which builds more trust in adapting and adopting practices as “we could go in and meet those people on the ground and talk to them. But that information might not be as valuable coming from us as it is from someone who's in the community” because “we're always gonna have that local government banner on us” (LG-003). This indicates that community connectors can make a significant impact in their community, workspace, or at the household level. This finding confirms that the social milieu in which we live shapes us Bourdieu (1977, 1984), our attitudes and behaviour, and that trust and interest is generated through networks of support and care.

The community connector principle is also applied at the MUD level, where LGs “try to find somebody in each unit block, who might be the de facto caretaker” (Inf-033). MUD caretakers oversee the shared bin areas at the complex, fix problems, and remind people of the rules — especially when new people “move into the building as they have to move into the behaviour everyone else adopted” (Inf-013). In this sense, both community connectors and MUD caretakers have similar roles when it comes to improving recycling behaviours (inform, show, and remind). The term community connector is used to exemplify the educational measure, illustrating that the perception

of normative behaviour by other actors in the community can serve to motivate community members to adopt new routines (Shove & Pantzar, 2012). Although described as a successful concept, relying on community connectors or MUD caretakers is considered a ‘vulnerable’ approach due to the omnipresent likelihood of people’s life situations to change (location, available amount of free time, etc.) therefore rendering this approach unreliable and unpredictable (Corvellec et al., 2018).

Lastly, due to privacy and safety aspects, community connectors cannot investigate actual bin content at home to clearly identify specific recycling issues. However, some councils apply an initiative known as ‘bin tagging’ in selected LG areas, which is discussed in the next subsection.

5.3.2.4 Bin Tagging

The documentary analysis undertaken in Phase 1 indicates that while residents express a commitment to act responsibly by adopting sustainable practices, kerbside recycling is a voluntary action with no associated penalties if not carried out correctly (Commonwealth of Australia, 2018a). To improve residents' kerbside practices, some LGs run initiatives called ‘bin tagging’ in selected areas of high contamination to collect data on waste composition and contamination rates and improve source separation. Bin tagging is a nascent program applying a combination of tools differing across LG areas (WALGA, 2022). A typical approach is to visually inspect bins in a chosen street or area over a certain number of weeks (e.g., 3 times over 6-8 weeks), providing on-the-spot direct feedback on the content of recycling by placing a tag on the bin (green, orange, red). The tag indicates if the content in the recycling or other inspected bins is appropriate. For example, if high levels of contamination are found in the recycling bin during a certain number of inspections, the bin will not be emptied, and individually tailored performance feedback will be given via letter or face-to-face. As such, bin tagging’s essential elements are feedback and enforcement, which are viewed as highly effective (Cleanaway Waste Management Limited, 2019; Kaufman et al., 2020).

A further advantage of bin tagging programs identified by 12 environmental practitioners is the ability to collect data about the composition of MSW streams,

particularly regarding the types of recyclables that end up in landfill and what types of contaminants enter kerbside recycling bins. LG-018 notes that the information obtained about the composition of general waste and recycling material can build the foundation to provide personalised feedback to residents to avoid contamination issues. LG-001 explains that the “method works well through its naming and shaming effect as residents don't want to get a visible sticker on their bin saying you've been naughty.” Therefore, the 12 practitioners who are familiar with the program consider it effective in that it provides personalised feedback about what disposal behaviours should be discarded, disseminates information, and “raises awareness with contamination rates in some cases dropping from 40% or 50% to 10%” (LG-013). However, according to one expert informant who ran bin tagging programs, the outcome has limited lasting impact. Based on experience, Ind-036 notes that “as soon as we leave, we know they go back to their old habits although we have generally found that they're not going back to being worse than they were”. People need constant reminders as “they have different learning capabilities, adapting at different paces” (Inf-028). Although considered generally effective, bin tagging is a resource-intensive program and is therefore only applied in selected areas (Cleanaway Waste Management Limited, 2019).

5.3.2.5 Multi-sectoral approach

A multi-sectoral approach involving the participation of both government departments and other stakeholders is identified by six interviewees as an important lever to improve a wide range of environmental problems, including insufficient recycling rates. However, this approach has two major challenges. Firstly, in terms of waste management and best practice, although “the understanding for more collaboration is there and some sectors try to work with each other, not everyone is on the same knowledge level yet” (SG-034). Secondly, the need to coordinate with different stakeholders is difficult as “every department has their part to play” (LG-030). The WA DWER has paved the way for more collaboration by having different government departments sign up for deliverables related to WARR that fall into their area of expertise or responsibility and instigating a waste reform advisory group as a regular three-monthly reporting mechanism on such deliverables (Waste Authority, 2021). However, this is a state-driven initiative. No other state or government department has

the obligation to follow such an approach. The CEO of a peak WARR industry association notes that “you need the government to come in like a supervisor. Otherwise, every area of this industry is working on their own” (Ind-031). Industry associations have long called for increased national leadership to manage WARR issues (Commonwealth of Australia, 2018b). However, at the federal government level, “collaboration is recommended but not imposed” (Inf-028).

5.4 Case Study of the WA Container Deposit Scheme

As outlined in greater detail in Chapter 4, section 4.2.3., this thesis employs a case study approach to investigate how newly implemented recycling schemes can promote household recycling. This section presents the key findings of the case study of the newly implemented Western Australian (WA) Container Deposit Scheme (CDS) in the context of RQ 3 including findings emerging from the content analysis of WA CDS surveys (DWER, 2021; WARRRL, 2022a; O’Dwyer et al., 2022). Additionally, views from CDS stakeholders gathered during expert interviews conducted in Phases 2 and 3 of this study are presented. Section 5.4.1 provides an introduction to the case study, followed by drivers (Section 5.4.2) and barriers (Section 5.4.3) associated with participation in the scheme. Finally, Section 5.4.4 discusses approaches applied by the scheme coordinator and LGs to improve scheme participation.

5.4.1 Introduction to the Case Study

The WA CDS is a large-scale environmental initiative that aims to contribute to sustainable practice change and is the most recent of its kind implemented by an Australian jurisdiction at the time of this research. The design of the WA scheme follows the fundamental scheme characteristics of other Australian jurisdictions, including a 10-cents deposit value and an aligned scope of containers eligible to receive the deposit (see Chapter 2). The WA CDS, Containers for Change, is run by an independent scheme coordinator, a not-for-profit organisation called WA Return Recycle Renew Ltd (WARRRL). The scheme coordinator is responsible for meeting the scheme objectives, improving recycling rates, reducing litter, and engaging with the community (Scaltrito, 2022). To achieve these objectives, WARRRL is driving actions such as promoting the scheme to communities, licencing container refund

points, and guiding operations under the oversight of the WA Government (WA Return Recycle Renew, 2022). Prior to scheme commencement, the WA government determined a minimum requirement of 95 refund points in accordance with the population density in the Perth and Peel metropolitan areas, with no more than 5km travel distance between locations (DWER, 2019). Most locations in WA are operated manually and more than 40% of the entire collection infrastructure is run by charities or community groups[47] (Government of Western Australia, 2020a). In the context of redemption rates, the WA government defined a target of 85% by the 1st of July of the financial year 2022/23 (Government of Western Australia, 2019). In September 2022 the redemption rate was 58.69%, with a decelerating growth rate that dropped from 4% (between January 2021 and April 2022) to 1% (between April 2022 and September 2022) (WARRRL, 2022c). Interestingly, the growth rate information available via the scheme coordinator website outlines that this overall redemption rate is based on containers redeemed at CDS refund points (42% in 09/2022) and eligible containers thrown away through the kerbside recycling system that end up at MRFs (22.1% in 09/2022) (WARRRL, 2022b).

To improve decelerating redemption rates, the scheme coordinator focuses on strong scheme promotion through their state-wide public awareness and education campaign that provides “clear benefits in delivering a communication strategy which provides consistent and reliable information to the community and scheme participants” (DWER, 2018, p. 25). A review of the Containers for Change website and other media tools reveals that the WA scheme coordinator is actively pursuing the opportunity to build on increased scheme participation through donations to charity (Containers for Change, 2023b).

Surveys conducted by WARRRL, the DWER, and Curtin University in Perth confirm a strong scheme awareness amongst WA residents from the start of the scheme in 2021, with “nine in ten people aware that a container deposit scheme operates in WA”

[47] In total, the scheme is operated by 77 refund point operators that provide 258 refund points (Wheeler, 2022b).

(DWER, 2021, p. 22; WARRRL, 2022a). In 2022 this number increased to 98% as “it [the scheme] has been widely adopted across Perth within the first year of its implementation” (O’Dwyer et al., 2022). In Perth 73% of residents had participated in the scheme at least once within the first year. However, since July 2021 participation has slowed down, “indicating the need to encourage more first time users […] while also maintaining existing users […]” (WARRRL, 2022a, p. 23) to avoid deceleration. All five interviewees from WA confirm that the number of people participating in the scheme flattened after 8 months (WARRRL, 2022a). Expert informant Ind-028 states that “the numbers have stalled a little in terms of the uptake of the CDS in the general community”, reasoning that "with low community engagement I'm not hearing anyone who knows about this intimately. I still have to explain about the 10-cent refund when I'm out with friends, it's kind of amazing.”

Interviewees wondered why the scheme coordinator's campaign has not resulted in a larger uptake of return rates, as “it was a huge amount of money spent in campaigning and it was a really clever, creative campaign and the expectation was that it would translate into more container volumes coming through. But we haven't seen that” (Ind-028). O’Dwyer et al. (2022, p. 24) note that there is a need to place “strong emphasis in communications on the environmental benefits of recycling through the DRS (CDS) compared to alternatives (e.g., curbside and on-street recycling)”. Thus a potential reason for this slow uptake may be the WA CDS campaign's focus on the incentive it offers rather than environmental benefits (Containers for Change, 2023a).

Return frequencies are another indicator for scheme usage. Compared to regional residents, metropolitan residents return containers both less frequently and in smaller volumes at return points. DWER (2021, p. 16) indicates that “metro residents are more likely to dispose of their containers through their kerbside recycling (34%)”. O’Dwyer et al. (2022, p. 30) find that “household type does appear to affect the uptake of CDS, as there was less uptake of the scheme by apartment dwellers”. A potential reason for this finding is limited space for storage at MUDs in metropolitan areas. This view aligns with other practice-based consumption studies that identify that disposal practices are

impacted by space (Bissmont, 2020a) in addition to the barriers to good household kerbside recycling in Australia identified in Phase 1 and 2 of this thesis.

5.4.2 Drivers for Scheme Participation

WA CDS resident surveys and the research by O'Dwyer et al. (2022) identify environmental, financial, and social benefits as major drivers to scheme participation. Environmental practitioners interviewed in Phase 3 indicate that these drivers have a significant impact on scheme participation in WA. A range of marginal drivers are also identified, including to "provide children with pocket money" and "being a role model to the younger generation" (DWER, 2021, p. 14).

Environmental Benefits and Trust in the System: Phase 3 indicates that environmental benefits are the strongest driver for CDS participation, suggesting that WA residents value pro-environmental actions (O'Dwyer et al., 2022) over the obvious monetary incentive (WARRRL, 2022a). However, given that the scheme coordinator is basing their education program largely on an incentive-based promotion, it is surprising that the deposit value of 10 cents is not the primary motivator for scheme participation. Survey results indicate that CDS participation driven by environmental benefits might slowly build back residents' trust in the system (WARRRL, 2022a). This sentiment is echoed in the interviews, with LG-023 noting that "some residents return containers with a sense of satisfaction seeing them being separated into clean material streams at the point of collection". A state government public servant points to a greater "sense of trust around Containers for Change [in the context of recycling] than there is around kerbside recycling systems" (SG-030). Taking containers to a refund point and seeing how they are being counted and separated by material type creates the feeling that "they are really getting recycled compared to chucking everything in the same bin" (SG-030). This also promotes understanding that "container lids get recycled locally and turned into products" (SG-031). Such approaches capitalise on residents' desire to see what happens to their recyclables by developing campaigns that shape public social discourses by exemplifying that containers and container lids can become a resource for making new products, thereby further building back trust in the system and harnessing the value of source separation. SG-029 notes that building trust in the

system contributes to a “perception and uptake of the schemes having a quite profound impact on recycling behaviour to those who embody the practice”. However, O’Dwyer et al (2022, p. 24) show that a general “understanding of the [environmental] benefits of the scheme and why it is a preferred method of recycling appears to be lacking”, indicating there is still a lot of work to do in terms of highlighting the link between the CDS and its benefits for the downstream recycling process.

Validation of the Financial Incentive: Countries running CDS view the financial incentive as a relevant driver to increase redemption rates, applying between 0.05 and 0.28 USD cents deposit per container depending on variety of environmental, social and economic factors (KPMG, 2020). However, during the interviews in Phase 2 and 3, the majority of experts (20) pointed to a rather weak effect of the 10 cents deposit. Some interviewees suggest that the 10 cents return is most effective in low socio-economic areas, leading to a significant number of containers returned in states such as NSW (White, 2023). Interviewees from NSW, a state where a CDS has been in place since 2018, note that in general, redemption rates in the western suburbs of Greater Sydney are much higher than in the eastern suburbs. Two experts from WA and NSW (LG-018; Inf-026) point to the fact that in low socio-economic areas, the financial incentive is an effective approach to increase participation in the scheme. Ind-032, an expert informant from the Northern Territory, where a scheme has been in place since 2012, notes that in advertising “lots of pictures of the environment and things like that, are often a waste of money because people don't care about the environment. They care about cash”.

Social Benefits through Donation: O’Dwyer et al. (2022) note that some of the financial benefits collected through CDSs are donated to different types of not-for-profit organisations, such as community groups, charities, and schools. The WA CDS scheme allows users to make a donation to the bank account of an accredited charity or community group via their member number. In April 2022, 4500 community groups and charities held a CDS member number in WA and $3.7 million AUD in refunds were donated, which “tells you the amount of interest [in donation-based scheme participation] right across one end of the state to the other, and those organisations

[charities] can provide access to the scheme through donation points" (Wheeler, 2022b). The scheme coordinator reveals that in the first 1.5 years of the scheme, the use of donation-based refund points has doubled from 6% to 12% (WARRRL, 2022a). WARRRL promotes the concept of donation-based participation through special initiatives (such as Empties Day) that encourage residents "to realise the potential of their drink containers by saving them from landfill over the festive season" (Shaw, 2022, p. 1) and donate them all on the 29th of January to a charity of their choice. This initiative and its enormous potential[48] were promoted via "social videos, outdoor cinema, state-wide press, SEM, refund point materials, digital billboards and Air Ads" (Shaw, 2022, p. 1) with the aim of ensuring that every WA resident realises the potential of their empty drink containers. As such, donation-driven participation is strongly promoted as a pathway to scheme participation in WA.

Several interviewees from Phase 2 and 3 indicated that donations to a resident's own local community are most desirable for household. For example, a LG public servant explains that when parents donate to local schools, they feel rewarded when they see "the new team uniforms were financed through the scheme showing that their efforts of recycling were worthwhile" (LG-001). In this context, three experts report that donation-based participation reduces the factor of inconvenience as residents can drop off containers at a place where they go anyway, such as the local school or "charities, business and fundraisers come around and collect containers, from people who aren't interested in doing it themselves – this idea is a big one" (Ind-034). Therefore, donation-based scheme participation can counteract one of the main critiques made by residents in the context of convenience of the scheme, namely that "individuals are having to make specific trips in their vehicles to dispose of the containers" (O'Dwyer et al., 2022, p. 21).

[48] Approximately 420 million eligible drink containers are sold in WA between December and February each year, offering a potential of $42 million in 10c refunds (Shaw, 2022).

5.4.3 Barriers to Scheme Participation

Three main barriers emerged from the survey analysis and expert interviews, namely the relative convenience of the kerbside system, lack of space, and lack of time. A range of marginal barriers are also identified, such as coverage of drop-off locations and types, the eligibility of containers, shortage of staff at refund points, and operational/technical difficulties. These examples are acknowledged; however, they appear to be temporary, less frequent in practice, or not consistently mentioned within empirical data.

Kerbside System: Both the secondary and primary data investigated in this case study strongly confirms that the relative convenience of the kerbside system in point of fact imposes a barrier to scheme participation. For instance, Ind-017 comments that “those of us who have steady jobs, prefer the convenience of the yellow bin instead of using CDS”. In a similar vein, LG-001 observes that “the mainstream people are just so flat out with making money, looking after children or study. They’d like to do the right thing, but it just can’t be inconvenient”. Moreover, informants note that “time poor people will always go for the easiest option that is the kerbside system” (Ind-032) and do not want to sacrifice their personal free time to “walk the extra metre” (LG-005) or have “to think about sorting and separation” (LG-008) as they have “more important things on their personal agendas” (LG-005). CDS practices therefore compete with practices from the household kerbside system. LG-005 notes that there is a “culturally shared understanding of using the well-established kerbside system”. The scheme coordinator's surveys from 2021 and 2022 indicate that in the context of “in & out of home [recycling behaviours] – yellow bins [are] still winning” (WARRRL, 2022a, p. 10). The surveys also reveal that many residents, particularly those in metropolitan areas who have never used the scheme before, are not incentivised enough by a 10-cent refund per container to make the additional effort in their daily routines (e.g., to collect and drop off containers), identifying traffic and inconvenient opening hours as the most common obstacles (WARRRL, 2022a).

This is supported by all five experts interviewed during Phase 3, who point to a low validation of the incentive, especially in affluent areas, leading to low return rates: “not

because they [residents] don't think the environment is not important and the overall effect of CDS is positive, it is just that the incentive to get $2 or $10, or whatever back is just not as great" (LG-018). When asked if the incentive really makes people participate or not (LG-023) responded:

> *"In certain areas yeah, yeah, but in areas such as around Fremantle, not much has changed compared to the old days. Because we're a higher demographic 10 cents doesn't really mean very much. Generally. So, we're probably putting more through the recycling stream than other areas."*

This leads to the assumption that, conversely to the driving force of the 10 cent incentive identified in low socio-economic areas, in affluent areas residents appear to be more driven to recycle through the existing kerbside system as they value the convenience of the system and feel it is part of their cultural responsibility. Table 5.2 summarises the reverse effect of drivers and barriers to scheme participation in affluent and low socio-economic areas.

Low socio-economic areas	**Affluent areas**
Kerbside practices ↓	Kerbside practices ↑
CDS practices ↑	CDS practices ↓

Table 5.2: Reverse Effect of Kerbside Recycling and CDS Practices Based on Different Socio-Demographics in Australian Metropolitan Areas.

This result can be linked to practice-based research conducted by Wiltshire et al. (2019) who assert that green policy changes addressing social systems and structures often inadequately conceptualise behavioural differences within socio-economic groups exposed to varying educational, cultural, or social conditions. As such, varying

educational efforts in different socio-demographic areas presents an interesting point of departure for further practice-based discussion.

In the context of improving scheme participation, during Phase 2 many experts (11) expressed the opinion that over time the deposit value should be reconsidered, given the average Australian income and living standards (Inf-011). This is supported by the regular publication of media statements such as 'CDS needs an increase in deposit refund – now' by the influential industry magazine *Inside Waste* (Wheeler, 2022c). However, while an increase of the deposit value could increase overall return rates, it would also have a costly effect on beverage prices (KPMG, 2020).

Lack of Space: The lack of space for at-home waste separation is another barrier to CDS participation. As outlined in Chapter 2, households in Australian metropolitan areas generally organise their waste into two bins: one for general waste and one for recycling. In order to participate in CDS, a third receptacle for the separation of containers is required in the home in order to keep eligible containers out of the standard 2-bin system. However, a survey conducted by the DWER (2021, p. 4) reveals that people who participate in Containers for Change are typically "not making the necessary behaviour changes and simply forget to use the scheme". Changing and developing new behaviours (e.g., to dispose of containers through a refund point) takes time (DWER, 2021). This thesis posits that sufficient space is also required. Competition with other waste practices can exacerbate this space barrier. For example, the introduction of "FOGO will take up further space for an additional receptacle for food waste in many metropolitan households resulting in less room for e.g., separating out eligible containers" (Ind-031). Although additional source separation practices can have a positive effect on kerbside contamination (Waste Authority of Western Australia, 2020), FOGO may pose a competitor for CDS practice. A state government public servant from WA confirms the state "is actively promoting FOGO recycling helping LGs to roll them out over the next three to four years. The infrastructure for FOGO will be supplied by the LG" (SG-019). Thus, residents are being encouraged to participate in FOGO and CDS at the same time. The potential interplay between both practices is further discussed in Chapter 6.

Lack of Time: Four LG public servants (LG-008, LG-013, LG-014 and LG-015) and two industry members (Ind-032 and Ind-011) identify a lack of time as a barrier to CDS. Residents typically do not try to reduce the time required for CDS participation, for example by combining the practice with other practices. Surveys reveal that only a small number of active scheme users (one in ten) utilise refund points for redemption. This indicates that residents do not necessarily "make it (CDS) part of an existing trip" (DWER, 2021, p. 17) such as to their local shopping centre, work, or church. Only a small proportion of active users combine CDS with other practices or systems of practices (e.g., consumption practices).

The finding made by the scheme coordinator, that few residents make CDS part of their existing routine supports the argument that many residents prefer the convenience of the kerbside system rather than having to compromise to perform another practice. However, a CDS survey by the scheme coordinator (WARRRL, 2022a) shows that the CDS can be effectively included in other practices. Surveyed residents indicate their preference for refund points to expand their opening hours to weekend mornings, as these are times when people typically do their weekly shopping. O'Dwyer et al. 2022, p. 22) note that the lack of inclusion of CDS in existing routines is "a central challenge for the uptake of CDS and its sustainability in terms of individuals that are having to make specific trips in their vehicles to dispose of the containers". This thesis suggests that daily practices do not necessarily have to compete and that there is potential to increase CDS participation if it can be performed in conjunction with weekly shopping practices.

5.4.4 Approaches Applied to Improve Scheme Participation

SG-032, a senior government employee from WA involved in the CDS, confirms "the campaign launched at the start was a classical simple awareness raising type of campaign". However, due to insufficient return rates, all five experts interviewed during Phase 3 note that nine months after scheme commencement, in winter 2021, the scheme coordinator rebranded Containers for Change to increase the number of containers coming through the scheme. Several rebranding initiatives were rolled out to address low community engagement in a more interactive way, such as via public

events to showcase the CDS and the creation of positive stories for social media (SG-031). According to Ind-029 the brand is “now stronger, much more unified, funkier, a kind of a cool looking brand driving that new image across a number of media”. A LG education manager with extensive experience in WARR characterised the campaign as being “the biggest, best bit of waste advertising I've ever seen in WA” (LG-023). As noted by SG-031, SG-032, and LG-029, the need for a rebrand within the first year of operation indicates the enormity of the challenge of reaching the scheme's target of 85% container return rates by the 1st of July of the financial year 2022/23 (Government of Western Australia, 2019). This appears to be an ongoing problem, as several interviewees highlight the need to socialise the scheme more broadly. LG-023 notes that “CDS is not really a barbecue conversation”, while SG-032 identifies a segment of the population “sitting on the cusp”:

> *“Only 50 per cent of people in the state actively engage with the scheme in terms of going to refund points and taking containers back. So, the strategy now is to try to engage with that proportion of people that is sitting on the cusp. To give them a reason to engage because they are aware of the scheme, but they haven't quite reached the motivation to do something” (SG-032).*

This quote suggests that public awareness has yet to act as a social force to translate into the desired results and shape a new social norm. State government public servant SG-031 observes that “looking at our evaluation from last year we are only making very small gains in terms of behaviour change”. Her suggestion is to expand the service by accepting other items such as batteries or white goods at existing container refund points. Ind-036 reports that in South Australia, where a CDS has been in place for 45 years, this approach has delivered positive results as “they got to a point where the depots added much more value in terms of resource recovery because they also captured cardboard, they capture batteries, they captured scrap metal, so they became a localized community resource recovery hub — CDS is probably in many instances only about 50% of their business” (SA Environmental Protection Authority, 2022). The interviewee suggests that expansion of the CDS service in other Australian jurisdictions to serve as localised community resource recovery hubs symbolises the importance of the communal element and collective action within the wider realm of sustainability.

Another interesting approach to increase scheme participation from the LG perspective is to expand existing bin tagging programs by investigating not only waste compositions in bins and contaminants but also the number of eligible containers:

> *"When the bin inspectors see containers in the waste bin, they're going to leave a flyer about the nearest refund point and letting them know they are throwing away money. They will also leave a bag so that people have got the information and they've also got the infrastructure to begin to collect it" (LG-030).*

This bin tagging initiative will be tested in 2023, starting with 10,000 households across different regions of the Western Australian Local Government Association. Experience to date suggests that such an initiative is likely to be effective, as discussed earlier in this chapter. This points to the opportunity of creating a link between the CDS and bin tagging, which might be beneficial for change practices. This finding is discussed in more detail in Chapter 7.

5.5 Chapter Summary

This chapter provides a description of the findings emerging from the three phases of this study. Firstly, while strong drivers to practice kerbside recycling are identified (notably the recognition of it as a culturally shared norm), practicing it correctly faces numerous significant barriers. These barriers reach across all elements of practice, such as diversity of packaging (material), locally varying recycling rules (competence), and lack of accountability at MUDs (meaning), hindering more effective action. This chapter identifies four core material barriers that have a flow on effect on three core competence and four core meaning elements that negatively affect household kerbside recycling. This connection is further discussed in the next chapter.

Secondly, in order to enhance kerbside recycling, this chapter discusses findings in the context of policy initiatives and a range of practical and education measures implemented to improve kerbside recycling. Policy frameworks have a direct effect on the performance of kerbside recycling practices as they can impact key structural

discrepancies such as different kerbside system standards, complex packaging, absence of a unified industry landscape, and lack of space at MUDs. The federal government emphasises the importance of making progress at the material level (e.g., through the alignment of varying collection and sorting systems that have a negative impact on residents' sorting and separation skills). However, because such aspirations are not mandated at federal level, it is difficult to mitigate problems that follow from these discrepancies (such as unaligned recycling rules that impair progress towards improvement in the quality and quantity of kerbside recycled material). Some environmental practitioners employ innovative measures to improve recycling practices (such as implementing community connectors or bin tagging programmes) to achieve the restoration of trust in the system and improve recycling skills. However, without aligned systems there is no aligned education. Furthermore, without the development of local markets for recycled materials there is widespread mistrust in the system.

Thirdly, the WA CDS case study enhances recycling outcomes by incentivising residents to adopt new practices such as further source separation. However, overall container return rates are decelerating. Interviewees suggest there is a trend of generally stronger scheme participation in low socio-economic areas (due to the financial incentive) and a reverse effect in affluent areas (due to the convenience offered by the existing household kerbside recycling system). To strengthen scheme participation, the WA CDS coordinator implemented a strong state-wide public awareness and education campaign. The promotional focus on the environmental and social benefits of the scheme are identified as strong drivers to scheme participation, followed by financial incentives. This finding suggests that utilising varying promotional approaches in different socio-economic areas might be of benefit; this is further discussed in the following chapters.

The implications of the above findings are explored in Chapter 6 by invoking SPT in order to contribute to a deeper understanding of household recycling practice and answer the research questions.

Chapter 6: Analysis and Discussion

6.1 Chapter Overview

Informed by previous studies applying SPT to environmental topics, notably Reckwitz (2002), Shove (2004), Shove et al. (2012), Hargreaves (2012), Kuijer (2014), Higginson et al. (2015, 2016), Hampton (2018), and Watson et al. (2020), this chapter utilises a SPT lens to analyse the empirical findings in relation to the overarching focus of this research, namely in what ways SPT can contribute to a better understanding of household recycling practices in Australian metropolitan areas. This chapter seeks to answer the three research questions: (1) What are the a) drivers of and b) barriers to household kerbside recycling practices? (2) What are the perceptions of environmental practitioners in relation to a) policy and b) practical measures that seek to improve household kerbside recycling practices? (3) In what ways can newly implemented recycling schemes such as the Western Australian Container Deposit Scheme contribute to the enhancement of recycling practices? This chapter proceeds as follows. Section 6.2 applies the Shovian practice model to household kerbside recycling practices to address RQ 1, Section 6.3 examines policy interventions and practical measures employed to enhance household kerbside recycling practices in order to address RQ 2, and Section 6.4 assesses the contribution of CDSs to address RQ 3. Section 6.5 addresses the overarching focus of this research, identifying the contribution of SPT to understanding household recycling practices in Australian metropolitan areas. Finally, Section 6.6 concludes with a chapter summary.

6.2 Applying the Shovian Practice Model to Household Kerbside Recycling Practices

This section addresses RQ 1 by identifying both drivers and barriers in relation to household kerbside recycling practices. Phases 1 and 2 yielded a range of key drivers. The following main drivers have been identified: Firstly, the majority of Australians believe recycling is important, with recycling practices forming an institutionalised normal activity performed in many households. Secondly, practicing recycling is facilitated through suitable bin and collection coverage in metropolitan areas. Thirdly, the Covid-19 pandemic has increased residents' validation of the environment and its corollary that residents are more willing to adopt more sustainable recycling practices. According to Shove et al. (2012), the efficient performance of a practice is underpinned

by the significance of participation in a practice and the effective interlinking of the three practice elements, namely material, competence, and meaning (Shove et al., 2012). While Australians have a strong moral compass when it comes to recycling, and recycling infrastructure at the household level is well facilitated in metropolitan areas, this research affirms the strong presence of inefficient recycling competencies. Many residents might believe their recycling efforts are good, not realising that they actually send a lot of recyclables to landfill. However, notwithstanding the need to improve residents' behaviours, particularly regarding appropriate separation of waste from valuable recyclables, the onus of poor recycling practices should not predominantly sit upon residents' competencies. There are other material and meaning barrier practice elements that contribute to underperforming household kerbside recycling practices. Barriers from all three practices element categories have been identified throughout the field study of this research. In total this thesis identifies 11 practice elements as core barriers contributing to inefficient household kerbside recycling practices. The finding of barriers in relation to recycling that can be classified as practice elements suggests that recycling behaviours can be understood through a practice lens.

Table 6.1 presents these barriers clustered into practice element categories in line with Shove et al. (2012). The barrier elements are also organised in a hierarchy (as depicted by the arrow). This hierarchy shows that inefficient recycling practices derive from four material barrier elements, shaping three inefficient competence elements and four unsustainable meanings carried throughout the population. The assumption that material elements are a starting point for shaping practice elements is not new to practice research. For example, Hampton (2018) reveals that the re-interpretation of a material element (a bicycle) is central for understanding continuity and changes in the relational dynamic with competencies and meanings, identifying newly evolving barriers over time, such as risks and liabilities.

This thesis does not apply a re-interpretation of the four identified material elements in the context of household kerbside recycling. However, the interpretation of the problem starts with the consideration of four material barrier elements (that are outside of residents' control), leading to further barrier meanings and competencies within four scenarios of underperforming kerbside recycling practices. This is due to the relational dynamic of materials with elements of competence and meaning that subsequently

affect residents' daily practices. This thesis identifies a range of additional barrier elements (see Appendix G for the full list); however, the elements listed in Table 6.1 have the most significant associations with the research problem.

Scenario	Material Elements		
1	Different Kerbside System Standards		
2	Complex Packaging		
3	Lack of Space at MUDs		
4	Underdeveloped Onshore Industry Landscape		
			
	Competence Elements		**Meaning Elements**
	Varying Waste Education		Confusion
	Australasian Recycling Logo		Extra Effort
	Lack of Accurate Sorting and Separation Skills		Lack of Accountability
			Lack of Trust in the System

Table 6.1: The Interrelationship Between Core Material Barrier Elements of Yellow Bin Kerbside Recycling.

Before describing the scenarios in more detail, it is worth noting that there is no one unique way of performing a practice as it exists by virtue of repetitive linking of its elements (Reckwitz, 2002). However, even if never performed absolutely in an identical fashion, insofar as most simple everyday practices such as recycling are enacted in the same local environment at specific moments where a repetitive linkage of standard elements can be consistently accomplished (Shove, 2010), the practice is most likely being performed as a habitual pattern of actions that do not involve much thought (Camic, 1986). This theoretical consideration indicates that residents do not jump from one ineffective recycling practice scenario to another, but individual

underperformance is more likely affected by only one of the four scenarios described below.

The following subsections (Sections 6.2.1 - 6.2.4) discuss the four common scenarios that emerge from analysis of the findings. Section 6.2.5 visualises these scenarios in a color-coded network map comprising an in-the-moment snapshot of the four scenarios following the logic of the Shovian practice model and Kuijier's (2014) concept of performance variations to flesh out the different geometries (element combinations) of each scenario connected through one core element (Higginson et al., 2015). This approach can generate strong predictions in the context of the research problem — underperforming household kerbside recycling — leading to beneficial explanations and recommendations, particularly in the context of why problematic materiality can lead to ineffective performances (Nicolini & Monteiro, 2016).

6.2.1 Scenario 1: Different Household Kerbside System Standards

In many metropolitan LG areas, residents are exposed to *different kerbside system standards* that create the foundation for *different waste education* per LG, leading to *confusion about recycling rules* and subsequently a *lack of accurate sorting and separation skills*[49]. As a result, defective recycling practices are commonly generated by the different system standards formulated by the federal, state, and territory governments. As discussed in Chapter 2, *different kerbside system standards* can be related to varying bin colours, bin sizes, collection frequencies, and MRF sorting technologies. This thesis reveals that variation in sorting technologies at MRFs within the national kerbside recycling system has led to *inconsistent waste education* at local government level. The variety of technologies is the result of a lack of licencing conditions for processing facilities, which in the case of Australia has led to a variety of accepted and unaccepted items for recycling at the local level.

[49] As defined in Chapter 1, this thesis refers to the term waste sorting as placing whole items into one appropriate bin. The term waste separation is applied to kerbside practices that require pulling whole items apart and placing their material components into various appropriate bins.

In the context of materiality involved in practice, various researchers (e.g., Hand et al., 2005) point to the increasing appreciation of the agency of materiality in contemporary practice theory. For example, Shove et al. (2012) define objects not just as carriers of symbolic meaning but in some cases as being directly involved in the conduct of practice. This connectedness is applicable here as disparate sorting technologies have a direct impact on *education* among states and local municipalities, generating collectively shared (Shove et al., 2012) *confusion*, a meaning element that directly impacts social order (Latour, 1992). Although the practice of recycling itself has a positive symbolic meaning that is shared amongst Australian communities, at the point of action at which *sorting and separation* practices take place, it can become inefficient due to the presence of the strong negative meaning element, confusion. This research demonstrates that household recycling is a recursively constituted performance. However, a strong cognitive barrier appearing during the practice, such as confusion — which is underpinned by the requirement to proactively clarify if items are recyclable — can override all good intentions. In the moment of confusion, residents typically stick to their established competencies and routines (Bartiaux et al., 2014) at the point of disposal, which hinders advancing skills within the socio-technological system in which the practice is embedded (Watson, 2012). It is therefore evident that disparate sorting technologies have a negative impact on recycling competencies.

From a SPT perspective, the more a practice is repeated the more it binds practitioners (Shove et al., 2012). As recycling is largely considered important and widely practiced in Australia (Cleanaway Waste Management Limited, 2022), by extension this would suggest that inaccurate skills might be well-established and ingrained, making them difficult to change. This further suggests that the variety of rules within the co-mingled kerbside system contributes to residents holding onto preconceived ideas, rendering them resistant to advancement. In WA, a policy intervention aligned the state's household kerbside recycling rules. However, due to the vast number of items that may or may not comply within an aligned system (provided in an A to Z list), which is difficult for educators to simplify through communication efforts, residents are likely to retain their well-established and ingrained autopilot. Reckwitz (2002a) finds that breaking 'mental routine' — for example by moving homes — can be a starting point

to rearrange and revalue a practice to disable this autopilot. However, similar to practical measures employed to adjust practice (such as bin tagging programs), it is necessary to provide continuous feedback to achieve long-lasting change.

6.2.2 Scenario 2: Complex Packaging

This scenario builds on the core material barrier element of *complex packaging* leading to incorrect *sorting and separation* behaviour. As outlined in the preliminary industry discussion in Chapter 2, the federal government has attempted to respond to the problem of complex packaging by introducing a co-regulated arrangement for *Plastic and Packaging* (Department of Climate Change Energy the Environment and Water, 2023a) including the responsibility for supermarket producers to apply the *Australasian Recycling Label* (ARL) on their packaging to guide consumers through disposal practices. This requirement for stronger and more targeted information-based communication, in the form of the ARL, can be viewed as a large-scale 'serial adjustment' (Shove et al., 2012) applied on a national level. The literature review in Chapter 2 reveals the tendency of complex packaging design as a key reason for the introduction of the ARL(The Commonwealth Scientific and Industrial Research Organisation, 2021). This thesis further emphasises that a 'co-evolutionary approach' (Røpke, 2009, p. 2496) occurs between evolving design and production processes and practice. Similar to scenario 1, this is outside of residents' control.

In the context of separation practices, this thesis confirms that the increasing complexity of products and product designs "further complicate the learning of how to dispose them properly and risk the creation of ever more confusion" (Knickmeyer, 2019, p. 7). More conscious thinking about pulling items apart is required to dispose of material components into the correct bins. Here the new practice of reading the ARL clearly assists by providing the required disposal information for each component of an item that carries the label. Due to the growing number of multi-complex items, it can be assumed that in order to become a knowledgeable practitioner in household kerbside recycling, repetitive checking and reading of the label on a variety of consumer packaging would be required. However, this is not perceived as a simple task (Topsfield, 2021), with experts interviewed during this study confirming that the

practice of reading the label is not yet a social norm amongst most residents. In contrast, the cognitive barrier of exerting *extra effort* (reading the label) required to apply accurate *sorting and separating skills* imposes a persistent hurdle. The ARL label is perceived as difficult to read (Topsfield, 2021), with Alzadjali (2010, p. 6) noting that understanding recycling labels in the global context "is becoming more difficult for the average person". In the Australian context, there is one nation-wide label (the ARL); however, this thesis reveals that its complexity imposes a mental hurdle to consumers, a barrier meaning element that can significantly impact the success of the initiative. Although as described in Chapter 3, practice change generally happens over time, for example when new technologies or social norms come to the fore (Hampton, 2018), the complexity of the logo might be causing ongoing resistance for some consumers. With the logo compounding the barrier of *extra effort* that appears in the moment of practice, it is an important component of the puzzle regarding the *lack of sorting and separation practices* in Australian homes. Conversely, in defence of the label, following Cochoy and Grandclément-Chaffy (2005) the introduction of recyclability information on existing packaging not only provides guidance but also has the potential to become a new criterion for consumer product choice.

The material component of complex packaging merits closer examination. As outlined in Chapter 3, multifunctional complex disposable packaging is an essential element within the reproduction of consumption practices and is entangled in single practices of consumption 'threading through' (Hui et al., 2017, p. 4) a multitude of other routines (Bissmont, 2020; Borrello, et al. 2020). The interconnectedness of packaging, for example between the temporal organisation and spatial arrangement of cooking and recycling practices (close connection) (Shove et al., 2012), indicates possible competition for space and time and therefore indirectly connects to a *lack of sorting and separation skills*. For example, the temporal demand to finish cooking a meal can compete with the temporal demand that comes with checking a label before item disposal or item separation (cognitive effort). As demonstrated in this thesis and research on consumption behaviours, consumers in today's society feel progressively more 'time squeezed' (Southerton, 2003, p. 9). Although one aim of multifunctional packaging is to reduce the time and space required to accomplish practices of

consumption (Müller & Süßbauer, 2022), having to check recycling information alongside other practices (such as food preparation) potentially increases the time associated with recycling, and therefore may become a barrier in the moment of disposal.

The Covid-19 pandemic led to a change of consumption behaviours, including increased online shopping and takeaway food consumption (Tchetchik et al 2021). The increased routine of ordering products or food online has exposed consumers to an increased pool of packaging not included in any of the Extended Producer Responsibility (EPR) schemes set up by the Australian government, resulting in “fairly poor information on that sort of packaging” (Int-027). This contributes to an increasing number of instances in which consumers face unlabelled packaging, ultimately not being able to perform the practice of following the instructions of the label and leading to higher contamination rates within the recycling stream. This lack of consistency in providing the ARL across existing consumption channels can reduce the likelihood of residents becoming faithful recycling practitioners, as being confronted by missing labels interrupts the ongoing accomplishment of repetitive linkage of practice elements (Shove et al., 2012) and the breaking of mental routines (Reckwitz, 2002a).

6.2.3 Scenario 3: Lack of Space at MUDs

Recycling requires additional space for *sorting and separation* activities. Typically, multi-unit dwellings (MUDs) exhibit poorer recycling rates due to a lack of appropriate space for these activities, e.g., lack of space for separate receptacles in the kitchen (Bissmont, 2020a; Briguglio, 2016). This leads to a ‘practice trade-off’ (Shove et al., 2012) in which the prioritisation of other practices in the context of limited space can create a measure of discontent as a result of not being able to create a convenient separation system for recycling. Following Shove et al. (2012), the extent of this feeling can determine if a situation is temporary or permanent. For example, inside the home some residents might choose to relinquish accountability, while others may be more determined and make alternative arrangements to sacrifice space in the kitchen occupied for competing practices (such as storing food) in order to reduce the impact created by the lack of recycling bins (Shove et al., 2007). Taking this step would most

likely depend on how strongly the norm of recycling is ingrained in an individual's life. Considering recycling is viewed as "important by 92% of Australians" (Cleanaway Waste Management Limited, 2022, p. 4) and is thus a social norm, limited space at MUDs might weigh positively on an individual's conscience in terms of making space for the practice to follow general trends and conventions.

In addition to a lack of space inside MUDs, the conditions at shared bin bays at MUDs in Australian metropolitan areas also contribute to the barrier meaning element. The typical conditions of overflowing, contaminated bins leading to low accountability at outdoor bin areas can exacerbate residents' individual resistance to trade-off space for correct recycling inside the home. This is because many of the everyday at-home consumption practices are produced by, through, and around individual chosen objects (Shove et al., 2007). The practical measure to improve the situation at shared bin bay areas by introducing MUD caretakers (community connectors), proposed by experts during Phase 2, is further discussed through a practice-lens later in this chapter.

In summary, scenario 3 demonstrates that the availability of space in the home represents a relevant variable for evaluating recycling practices. Non-recycling behaviours are exacerbated by a lack of space for recycling in the home and the typically poor conditions at shared bin areas at MUDs.

6.2.4 Scenario 4: Underdeveloped Onshore Industry Landscape

The enactment of the China Sword led to serious consequences for Australia's *underdeveloped onshore local industry landscape*. This thesis reveals that discrepancies in the industry landscape caused a *lack of trust in the system* in some residents that led to a certain level of abandonment of recycling practices, leading to a *lack of accurate sorting and separation skills*. Despite government support for a new industry landscape, industry investment in facilities has stalled for various reasons, one being the capacity of MRFs to only produce low-grade recycled material (see Chapters 2 and 5). The generally slow progress of improving the Australian WARR industry landscape (Sloan, 2023) can have an enduring impact on collective meaning associated with recycling. Although meanings can change quickly on a personal,

cultural, and lifestyle level (Shove et al., 2012), a new industry landscape cannot be built overnight. Australia's previous reliance on the export of low-grade kerbside materials (see Chapter 2) resulted in poor communication about the end of life of kerbside recyclables. However, following the China Sword and negative media coverage of the Australian WARR industry landscape, many residents have shifted their expectations and seek greater certainty in relation to recycling capabilities and the recovery of their recyclables in a circular economy. Valuing our waste as a resource can only legitimately be pursued by building a circular system. In the context of improving household kerbside recycling, the importance of building back trust in the system is essential to regain the motivation to improve *sorting and separation skills*. However, in Australia few significant positive examples have been promulgated through public social discourse.

6.2.5 Visualisation of Inefficient Household Kerbside Recycling Practices

The identification of these four scenarios of inefficient household kerbside recycling practices helps to highlight the inherent entanglement of barrier elements. Interconnectedness within and between core practice elements may make such a practice more difficult to shift (Higginson et al., 2016). However, following Higginson et al. (2016), such an understanding of the connections between elements can also provide insight into ways to intervene and ultimately shape more sustainable practices. Figure 6.1 summarises the cause and effect of the four scenarios described above, informed by the network diagram approach to depict the "internal structure" of each scenario (Higginson et al., 2015, p. 954). Figure 6.1 can be characterised as a practice-as-entity[50] (Kuijer, 2014) accommodating several variations of inefficient kerbside recycling practice.

[50] Recycling practice is associated with many driver and barrier elements, some core and many peripheral to the performance of the practice (Shove et al., 2012).

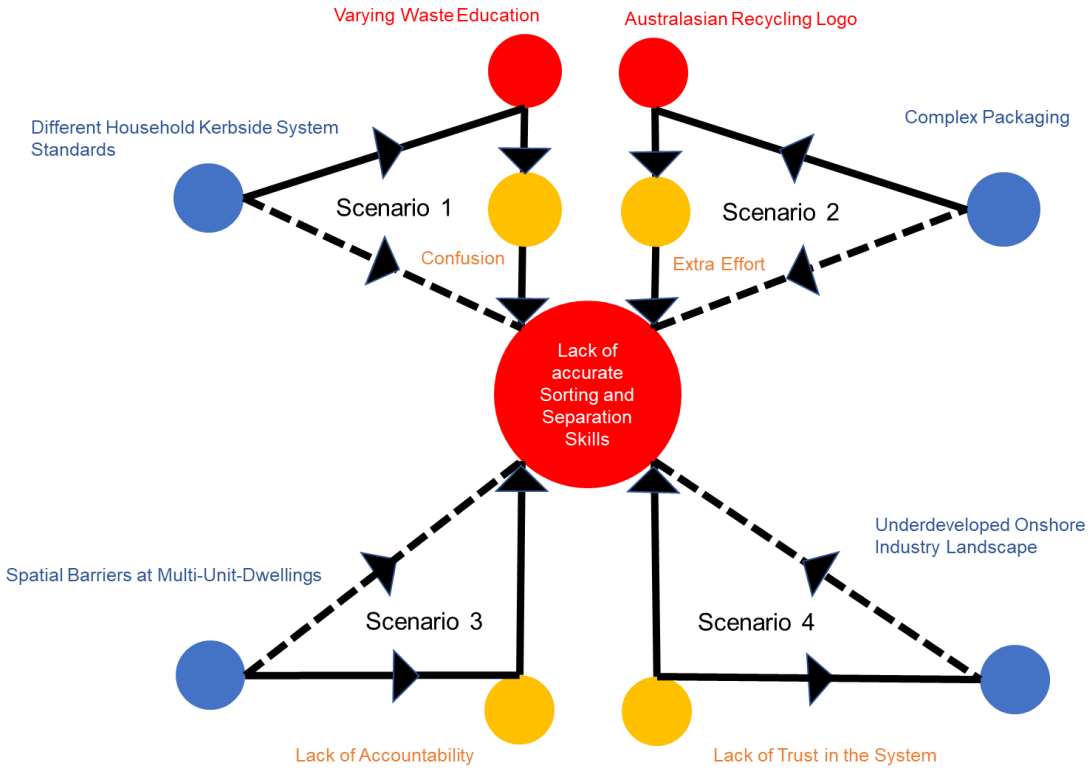
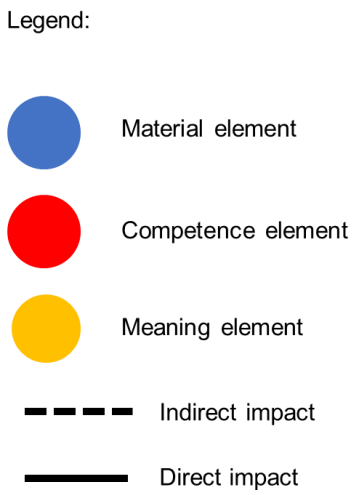


Figure 6.1: Four Kerbside Recycling Performance Manifestations Connected Through Barrier Elements.



The directions of the arrows in Figure 6.1 indicate that each of the four inefficient practice scenarios is caused by the problematic nature of their material element, which has a direct and indirect negative impact on competence and meaning. Each scenario ends with the same outcome, namely a *lack of accurate sorting and separation skills*, which is directly influenced by a meaning element. The interconnection of all scenarios

through one central competence element renders it a tissue (barrier) element (Shove et al., 2012) or core element linking the four scenarios together[51] by being part of each combination (Higginson et al., 2016). Hence the size of the circle that symbolises the connecting competence element is larger. Generally, practice research points to shared elements as being a strong influencer within a network. However, this thesis indicates that the shared element is itself a derivative of material elements. This thesis posits that the key to break off and change the inefficient constellation of elements resonates with materiality. This does not align with the majority of practice-based studies, which typically apportion more influence to their interconnected elements in shaping practice (Wonneck & Hobson, 2017). However, this notion aligns with the assumption that a tissue element, here a *lack of accurate sorting and separation skills,* can be improved through the interplay of the three element categories (Shove et al., 2012).

This emphasis on materiality is unexpected as the research problem — underperforming household recycling practices — points to a general lack of skills amongst residents in the household domain as being the core barrier that needs to be improved within communities to practice recycling effectively. This finding notwithstanding, the research reaffirms the effectiveness of practice studies in the shift away from individual behaviours to consider the underlying connections of elements and the importance of making their impact visible. The following section analyses whether proposed policy interventions and practical measures are likely to shape any of the elements visualised in Figure 6.1 to address the four scenarios.

[51] It should be noted that the tissue barrier element, namely a *lack of accurate sorting and separation skills*, can be connected to further peripheral elements such as language barriers or varying cultural meanings. For the sake of simplicity, this is not visualised in Figure 6.1. However, Chapter 3 demonstrates that practice manifestations are surrounded by a range of additional elements.

6.3 Political Interventions and Practical Measures to Enhance Household Kerbside Recycling Practices

This section discusses the findings from the analysis of environmental policy and responses from expert informants on how to enhance inefficient household kerbside recycling practices to answer RQ 2. Section 6.3.1 discusses policy approaches at federal and state level, and Section 6.3.2 analyses practical measures applied at local government level. The ability to 'zoom in' (Nicolini, 2009) at multiple levels of governance facilitates an analysis of how elemental dynamics of poor household kerbside recycling practices are likely to unfold in response to policy initiatives and practical measures. According to Anantharaman (2018, p. 556), 'zooming in' on measures and initiatives to improve practice has the potential to identify a need for collaboration of multiple authorities within 'hierarchical relationships' such as within the multi-level governance (federal, state, and local) that drive Australian WARR policy.

6.3.1 Policy Interventions to Improve Household Kerbside Recycling

Analysis of national and state policy demonstrates that policy makers seek to improve household kerbside recycling practices by proposing policy interventions addressing the three elements of practice, namely material, meaning, and competence (Shove et al., 2012). Policy interventions address three out of four core material barriers (scenarios 1, 2, and 4), which is foundational for improving yellow bin recycling practices. This thesis argues that addressing the majority of inefficient materiality can lead to long-lasting and large-scale behavioural change since their sphere of influence extends beyond fulfilling their own inherent purpose via their interconnectivity to competence and meaning (Figure 6.1). Addressing barrier materiality could in turn also reduce the extent of the flow-on effect on the identified core barrier elements, namely meaning and competence. However, Harris et al. (2016, p. 311) argue that a "combination of interventions is needed" to boost pro-environmental change of practice. This thesis identifies multiple efforts to address all three element types (e.g., by aligning education, implementing community connectors, or recycling logos). This is likely to help evoke pro-environmental behavioural change and create more sustainable collective norms. Accordingly, this research examines their potential to evoke behaviour change. As material elements are the source of inefficient recycling

practice scenarios (Section 6.2), national and state policy interventions[52] to adjust these elements necessarily have greater emphasis than local government policy interventions. It is essential that these elements are addressed concurrently with or prior to addressing competence and meaning.

In the context of household kerbside recycling, this thesis reveals that at national level, policy makers seek to make “serial adjustments” (Shove et al., 2012, p. 145) to systems with the aim of promoting and enhancing recycling practices. In the context of the four core barrier material elements (Section 6.2), such adjustments include: the alignment of kerbside system standards (scenario 1); the introduction and promotion of the ARL to address complex packaging (scenario 2); and the development of a WARR industry landscape (scenario 4). The spatial arrangements at MUDs (scenario 3) are not specifically addressed by national environmental policy. However, spatial arrangements are acknowledged by state governments (such as NSW) as a particular challenge in the context of improving and expanding household kerbside recycling practices. In the context of a practice view, by proposing ‘serial adjustments’ to three of the four material barrier elements, the federal government recognises the interconnectivities of elements of practice by indirectly addressing the connective tissue element *lack of sorting and separation skills* on several levels. For example, building a local mature industry landscape is not meant to only serve a practical purpose but also carries a symbolic meaning (Shove & Pantzar, 2005) for residents that can help build back trust in the system, subsequently promoting better environmental behaviours. However, within the limited Australian environmental policy change literature, a common view is that in the context of conveying such meanings to the public, the present Australian multi-government structure (see Chapter 2), hinders effective industry development due to the requirement of multi-sectoral collaboration. Take for example the core material barrier element identified in scenario 1 (*different kerbside system standards*). The need for alignment to improve such standards is clearly stated at national policy level (Australian Government, 2019). However, no progress has been reported. For example, in the latest National Waste

[52] Core barrier materiality is only discussed at national and state government levels since the power of local government to introduce new or align standards beyond their area of jurisdiction is restrained.

Policy Progress Report (DCCEEW, 2021b), the federal government claims that there is collaboration to improve waste management practices at all levels (Commonwealth of Australia, 2018a); however, evidently progress is slow. Accordingly, it can be argued that recycling practices are not yet at the level that Shove et al. (2010, p. 1281) refer to as "socially, institutionally and infrastructurally configured". Clearly, there is a need for a more synergistic approach between national, state, territory, and local governments to improve waste management practices. This argument is also supported by research such as by Jones (2020a) and expert informants interviewed in this study. To strengthen the system, further research in the context of multi-level governance relating to WARR related topics is proposed in Chapter 7.

At state level, governments such as NSW and WA follow national advice seeking to improve household recycling rates by making a commitment to more source separation, e.g., by introducing FOGO[53] (3-bin system) and CDSs (Government of Western Australia, 2020; NSW DPIE, 2021). CDS implementation is further discussed in Section 6.4. As food organics comprised about 34% of the MSW stream in 2016/2017, collecting and recycling them has significant potential to increase MSW recycling rates (Blanchard et al., 2023). Based on earlier research by Miliute-Plepiene et al., (2016) in the context of yellow bin kerbside recycling, a positive impact on contamination rates through the expansion of separation practices by adding a bin for FOGO inside and outside the home can be anticipated. From a practice-based perspective, the inclusion of new object arrangements (such as an additional recycling bin for food scraps) exemplifies the potential for making new, breaking old, or adjusting existing practices (Shove et al., 2012; Shove, 2004) as in the case of yellow bins. As Shove et al. (2012) observe, co-located practices can be spatially or temporally

[53] This thesis acknowledges that jurisdictions are making further commitments to improve the kerbside system on a B2B level, including the introduction of technological innovations for waste services (such as the newly created NSW procurement platform) to support the alignment of local services (see Chapter 5). The likely long-term impact of the initiative is acknowledged, given that technological innovations have the potential to contribute to the improvement of practice by directly or indirectly affecting the making of new or breaking of old practices (Shove et al., 2012; Shove, 2004). However, this research focuses on examining FOGO since the increase of source separation at the household level is likely to have a more direct impact on household recycling behaviour.

related, and are more likely to mutually influence each other. In the context of household waste and recycling practices, this interconnectedness is shown within the inner circle of Figure 3.2.

Due to a spatial and temporal relation between waste and recycling practices, the inclusion of new FOGO practices within households will require an adaptation of existing space, dedicated time, and skills to keep organics out of the 2-bin system. This thesis views the introduction of FOGO as a significant opportunity to address the connective tissue barrier element *lack of sorting and separation behaviours* outlined in Section 6.2. There is significant potential for both practices to share elements, for example during meal preparation in the kitchen. In this context, new FOGO practices and existing yellow bin practices are intended to be performed at similar times, subsequently requiring behavioural change such as disposing of food scraps in new FOGO bins, thus keeping them out of the standard 2-bin system.

This might in some cases cause competition regarding limited temporal and spatial resources (Røpke, 2009; Shove, 2009; Shove et al., 2009). Firstly, an increase in source separation practices requires additional temporal resources at the moment of disposal. This could potentially lower the care factor for accurate sorting if time is sparse in the moment of practice. However, if the practices are performed in close proximity (e.g., when both bins are installed in the kitchen) time might not be a competitive factor. In line with Shove et al. (2012), this thesis posits that if new material elements (such as bins for FOGO) can be accommodated within the existing micro-kitchen waste disposal system and used regularly, over time this can impose an omnipresent reminder of applying more source separation in general. Therefore, FOGO has significant potential to become a reminder for valuing and improving increased source separation, subsequently improving the quality and quantity of kerbside yellow bin materials.

However, generating space for installing a new FOGO bin into the existing micro-kitchen waste disposal system could present a competing spatial factor (Briguglio, 2016). This is particularly pertinent regarding spatial constraints for recycling practices

at MUDs (NSW DPIE, 2021). Therefore, making room for additional bins presents a complex initial barrier, especially at MUDs. At SUDs, sufficient space to include an additional recycling receptacle is generally available. Therefore, at SUDs it is more likely that green and yellow bins co-exist in the same kitchen realm, forming ‘mediating grounds’ (Shove et al., 2012) where space is equally shared, which subsequently can strengthen both the practices and their relation.

The above discussion demonstrates that in order to recast existing or adopt new household recycling practices, there is a need to capture, simultaneously, the extent to which they are rooted within systemic relations with other co-located practices or co-dependent practices (Shove, 2012) such as red and yellow bin disposal, shopping, cooking, or cleaning and their shared elements such as packaging, infrastructure, innovation, rules, collective social norms, or symbolic meanings that are involved in systems of consumption (Watson, 2012). It is pertinent to repeat here that to improve the quality of the yellow bin stream it is especially important to upscale and innovate MRF technologies from low-grade sorting to state-of-the-art standards and align recycling rules (The Commonwealth Scientific and Industrial Research Organisation, 2021). Additionally, to increase source separation by introducing FOGO, an alignment of yellow bin rules is necessary to reduce contamination and capitalise on higher quality feedstock produced by further processing and re-manufacturing it into recycled products, goods, or packaging.

In the context of the alignment of yellow bin rules, WA MRF operators and waste educators have reached a consensus regarding items accepted in the yellow bin with the aim to eliminate confusion. On this basis, educators established a detailed list with rules as to what can and what cannot be disposed through the yellow household bin. However, as reported by interviewees from WA, in practice the vast number of 250 recyclable items captured on one list (Recycle Right, 2019) can overcomplicate simple messaging and make it hard for residents to easily identify information in a timely manner. Having to make an *extra effort* to search for information in the context of recycling can lead to a degree of difficulty. This aligns with the complex packaging barrier, addressed at national level through the Australian Recycling Logo (ARL).

However, the complexity of the logo is also linked to a reluctance amongst residents to exert *extra effort.* Therefore, both educational initiatives demonstrate that, even if governments are eliminating certain core barriers (e.g., *different kerbside system standards and varying waste education*) there is still significant complexity involved in the co-mingled household kerbside recycling system, which can create new obstacles.

In the context of elements of meaning, the federal government has sought to directly address the core barriers of building back the *lack of trust in the system* that arose amongst residents in the wake of the China Sword — a problem discussed in scenario four (Commonwealth of Australia, 2018a). This issue can be addressed through public social discourse; however, within a still largely *absent local industry landscape* pro-environmental statements can only be linked to broader, future goals such as building a circular economy, but not to concrete actions or success stories. Referring to broader goals may be less impactful. The recent Rapid Evidence and Practice Review for Behavioural Public Policy (Kaufman et al., 2020, p. 13) commissioned by the Australian government in 2018 identifies “a strong need for localised, scheme-specific behavioural messaging”. Accordingly, attempts to build a green morale detached from specific daily practices (Gert Spaargaren, 2005) may be of limited effectiveness (Strengers & Maller, 2015) and subsequently less likely to lead to the making of new, breaking of old, or adjusting existing practices (Shove et al., 2012; Shove, 2004). Subsequently, without showcasing tangible industry improvements and explaining why recipients' everyday practices contribute to a more sustainable future, there is less likelihood of pro-environmental behaviour change. This is further discussed in Chapter 7. It is, however, worthy of note that the Rapid Evidence and Practice Review for Behavioural Public Policy recognises the value of ‘masscommunication efforts’ (Kaufman, et al., 2020, p.13) affirming that they “may better aim to build supportive beliefs about the importance of the issue, reinforcing norms supporting preferred behaviour (i.e. care/attention in recycling, participation, cooperation), and channelling engaged recipients to locally relevant support and information”.

6.3.2 Practical Measures to Improve Kerbside Recycling

This thesis argues that educational initiatives driven by local governments contribute to the improvement of kerbside recycling practices. As outlined in Chapter 2, educating communities is largely the responsibility of LGs, which often design tailor-made campaigns and initiatives that meet the needs of the local environment. As shown in Chapter 5, this is mostly accomplished by promoting recycling through a variety of local campaigns that apply communication tools to improve behaviours, typically by circulating information and messages of encouragement to address the evident *lack of accurate sorting and separation skills*. These findings confirm that many Australian waste educators continue to maintain the consensus that the right behaviour reflects personal choice, driven by recognisable attitudes and beliefs. Such educational efforts can be useful as Australian residents typically view recycling as a social norm. However, drawing on social practice theory, this research suggests that addressing the issue by starting at the material level would be more fruitful than focusing entirely on education. This aligns with the Kaufman et al. (2020) Rapid Evidence Report in which education is ranked as the second least effective measure, with other intervention types (such as context restructuring) ranking significantly higher. For example, making “physical or social changes that make recycling correctly easy and convenient” are proposed to “adopt [recycling] as a contextually queued habit” (Kaufman et al., 2020, p. 25). Miliute-Plepiene et al. (2016) explain that educational efforts to improve inaccurate sorting might be less recognised in communities that are provided with a convenient front-end kerbside collection system. A well-established system imposes recycling as a moral norm, but fails to acknowledge that the practice is often inefficient. This thesis does not seek to minimise the role of education; rather, it emphasises the need to shift the conversation to the concept of practice with consideration of all elements.

Taking a more practice-oriented lens, this thesis identifies two practical measures to improve household kerbside recycling competence. Hargreaves (2011, p. 95) notes that in order to achieve behavioural change within a local domain like the household “the role of social interactions and power relations in the grounded performance” should be given more attention. In this connection the first example is the implementation of community connectors, who promote better skills by giving practical

advice (addressing competence) and providing inspiration (addressing meaning). Following Shove et al. (2012), viral marketing through people that share the same social or local environment can increase the potential to bind ‘faithful practitioners’ (Shove & Pantzar, 2005). In like manner, by operating at the level of the community, community connectors are able to empower their fellow community members by the power of example. Recent research by the federal government also confirms that strategies which “include passing on information via demonstration or discussion where the behaviour is personally demonstrated by the communicator” (Waste and Circular Economy Collaboration, 2020, p. 45) are most effective to improve the quality and quantity of recycling. However, contemporary SPT argues that once change has been addressed, it is imperative for residents to repeatedly be reminded to reproduce the enactment of linking elements of the practice to strengthen it. For example, an appointed MUD caretaker serves as an ongoing reminder of accepted practice, potentially yielding long-lasting results. However, expert informants note that implementing the concept of community connectors is also vulnerable due to the shifting needs and availability of these actors. For example, people may switch jobs and no longer have time for community activities, or appointed MUD caretakers may move out, leaving a vacuum regarding accepted recycling practice.

The second example of a practical measure to promote better recycling skills is Australian bin tagging programs. Such programs are valuable at the meso (local community) and micro (individual resident) level. At the meso level, by gathering local data on recycling performances (e.g., bin composition and contaminants), educators can capitalise on such insights and address them through local education campaigns. At the micro level, the program provides personalised feedback to individual residents (e.g., communicating which incorrect recycling behaviours should be discarded). This practical feedback is rated by expert informants and other independent research as highly effective. Watson and Shove (2008) confirm the strong impact of expressing disapproval of a behaviour associated with negative practice. This approach has the potential to address the issue of inefficient recycling skills in the Australian context. Internal research conducted by Breadsell et al. (2019) indicates that behaviour change achieved through audits and personal engagement can last for multiple years. However, despite the widely acknowledged effectiveness of bin tagging programs, the

cost and resource intensity associated with such programs (WA Local Government Association, 2015) potentially limit their implementation beyond selected problematic areas (e.g., LGs with above-average contamination rates).

This thesis suggests that programs such as community connectors or bin tagging that also address the meaning element (Shove et al., 2012) of household kerbside recycling, such as through personalised feedback or negative experience via shaming, which have a higher potential to more effectively generate and facilitate practice change (Watson & Shove, 2008) compared to the traditional ABC approach. However, as the practice of kerbside recycling enacts and reproduces continuously in routinised moments, it is likely to require ongoing feedback to change the repetitive linkage and transform inaccurate performances (Shove et al., 2012). Both community connectors and bin tagging have thus far only been trialled in certain LG areas, and both approaches require significant resourcing (WA Local Government Association, 2015). As such, the feasibility of a wider roll-out remains to be seen. Furthermore, in the context of wider environmental education, the adoption of a systems approach (Blackmore & Smyth, 2002) that entails recasting the problem of underperforming recycling rates within its broad context — including a shift away from a reductionist approach that is primarily focused on improving simple skills — has not been clearly identified within Australian household kerbside recycling education. This demonstrates that the conceptualisation of recycling as an intersecting activity amongst other consumption practices is not currently considered in Australian environmental campaigns. As such, the interconnectedness of practice-entities within wider systems of practices is not addressed (Schatzki, 2002; Shove et al., 2012). This thesis argues that household kerbside recycling should be viewed as a practice intersecting with other daily consumption practices. Therefore, this thesis identifies a gap and potential opportunity within Australian environmental education. Recommendations as to how to proceed from this point of departure are further discussed in the next chapter.

6.4 The Contribution of Container Deposit Schemes to Enhance Household Recycling

The WA CDS scheme, with its return rate of 58.69% (WARRRL, 2022c) shows that making serial adjustments to incentivise participation in return systems contributes to an increase in the quality and quantity of household recycling streams (Shove et al., 2012). In WA the scheme coordinator provides a suitable return infrastructure meeting coverage requirements set by authorities (material); communicating clear scheme instructions (competence); and promoting financial, environmental, and social benefits (meaning), representing the three strongest drivers for scheme participation. The positive contribution of the WA scheme aligns with results from other countries that have implemented CDSs such as European countries (Miliute-Plepiene et al., 2016) and results from other recently implemented Australian CDSs such as in NSW, QLD, and the ACT with return rates of ≤67% (Blue Environment, 2022).

However, in the context of Australian early-stage schemes, none have yet reached a redemption rate near 80 percent or above, which are typically delivered by schemes of more maturity such as in the Northern Territory or South Australia that have been in place for over 20 and 40 years, respectively (KPMG, 2020). Experts from NT and SA note that the practice of returning containers has long been ingrained in the daily lives of residents. From a practice perspective, to ingrain new recycling practices, the extension of existing disposal activities “demand the implementation of novel organizational practices potentially conflicting with existing household routines” (Borrello et al., 2020, p. 2). The underperforming rates in WA demonstrate a slow uptake of residents' willingness to adapt (sorting, collecting) and adopt (returning containers) new practices. This slow uptake aligns with norm-oriented research that shows prescribing social norms such as participating in CDS through the use of institutional signals (Tankard & Paluck, 2016) can work but only to a certain degree.

The adoption of new practices takes time (Giddens, 1984), but uptake can be accelerated by focusing on shaping social norms. For example, CDS research from Sweden and Lithuania that compares the motivation for scheme participation between schemes of different maturity levels suggests that in the early stages of a scheme,

focusing on building collective norms for scheme participation can be effective and should be promoted (Miliute-Plepiene et al., 2016). In the case of building collective norms for scheme participation in WA, in 2022 the scheme coordinator rebranded the CDS to Containers for Change, focusing on implementing community engagement initiatives in a more interactive way (via public events and the creation of positive stories for social media) to strengthen norms. However, this thesis reveals that the scheme "is not really a barbecue conversation" (LG-023). This may be partly explained by the fact that the educational focus still lies on the financial incentive (Containers for Change, 2023a). The financial benefit is considered self-explanatory amongst residents, and as outlined in Chapter 5, is particularly strong in low socio-economic areas. The 10 cent incentive per container is likely to serve as an ongoing reminder for scheme participation within low socio-economic groups even without additional promotional effort considering the reported tendency of higher return rates in low socio-economic areas. This thesis posits that this tendency will most likely continue. Therefore, this research proposes that the financial incentive should not be the strongest focus for building collective norms; instead, the key meaning elements of environmental and social benefits should be promoted.

The majority of residents have engaged with the scheme at least once, but many do not change their practices to continue participating in the scheme (DWER, 2021). Strengthening the awareness of environmental and social benefits might recruit more first-time users to continue to participate in the scheme more consistently, thus reproducing new practices (Reckwitz, 2002) to 'normalise' them (Shove, 2003). This involves generating and sustaining opportunities for repetitive performance to create 'faithful practitioners', which in turn can spread the promotion of the practice. Sustaining opportunities for scheme participation is underpinned by existing core material arrangements (such as container refund points) that are smoothly integrated into existing social and technical systems (Shove & Pantzar, 2005; WARRRL, 2022a). Further building on environmental and social benefits can strengthen the role of implemented container refund points, which may serve as a constant reminder to nurture the performance of a practice and furthermore restrict, enable, or condition other practices.

In the context of core material arrangements, the existing kerbside recycling system serves as a competitive element to CDS schemes (Shove et al., 2012). Here again the importance of strengthening meaning surfaces. Indeed, it can be argued that residents' resistance to CDS practices emerges because the behaviours required to change are embedded in dynamics of other social practices that compete for space and time, rather than a general unwillingness to change individual behaviour. For example, spatial limitations associated with storage of an additional receptacle for CDS recyclables are more applicable to smaller dwellings such as MUDs (Briguglio, 2016). Many residents, especially in affluent areas, value the convenient co-mingled kerbside recycling system as a means of actioning their cultural responsibility and seem less motivated by financial returns. Warde (2005) suggests that ongoing commitment to the value of a practice is essential to keep the performance and routine of new practices in place. In the case of a CDS, such commitment does not seem to be achieved by financial incentives alone. In order to compete with the kerbside system, it is necessary to emphasise the environmental and social values of the CDS to strengthen such commitment.

Borrello et al. (2020) find that CDSs can cause concerns in relation to the additional effort that comes with the adoption of new practices, such as the extra handling of items required if departing from using the convenient kerbside system. Building on environmental and social benefits for communities can heighten environmental awareness and validation of generating social benefits for communities. Wenger (1998) identifies charities and community groups as examples of communities of practice that typically share practices over time. This likewise strengthens the argument of focusing on social and environmental benefits for communities to promote CDSs. WA offers the possibility for donation-based scheme participation (e.g., at schools), building regular cross-over points with other daily social practices (such as picking up children from school). This can contribute to the normalisation of the new CDS practice within one's local or social environment. Various reputable environmental researchers such as Hargreaves, (2011), Geels (2012), and Shove (2012) suggest practice change can persist when (new) elements interact with elements of other practices. Therefore, this thesis posits that donation-based scheme participation at schools (or other cross-over locations) could have a positive effect.

This is further explained in the following chapter. As outlined in Chapter 2, many Australian schools focus on building environmental competencies. By implementing donation-based refund points at schools, children, through their parents and the school, would experience school-driven educational endeavours combined with shared practical experience (collecting containers at home and dropping them off at school) to form strong practical knowledge.

6.5 The Contribution of SPT to Understand Household Recycling Practices

This study contributes to the understanding of household recycling practices by analysing kerbside recycling and CDS practices in Australian metropolitan areas through a social practice lens. In this context, SPT is used to explore the accumulation of elements and trajectories of practice. The exploration of such elements contributes to a better understanding of how kerbside recycling practices are enacted in the Australian metropolitan household. This research also investigates a range of interventions, including policy and educational measures, proposed by authorities to address underperforming recycling practices within the wider WARR system. The advantage of applying a SPT perspective to recycling practices and their interventions rests upon its capacity to shift the analysis from a focus on individual components (e.g., kitchen bins, dwelling types, sorting skills, and environmental values) to a framing of the research problem that shows the connectedness and interplay of diverse elements shaping individual performances (Higginson et al., 2015).

Building such an understanding in the context of household recycling can help to identify transferable lessons for practice change (Shove et al., 2012). In relation to the identification of transferable lessons, traditional social theories conceive behaviours as outcomes of clearly identifiable factors such as attitudes and beliefs. Accordingly, it is argued that addressing such factors with appropriate interventions is likely to result in the desired behaviour change. In contrast, from a SPT perspective, in order to identify transferable lessons it is necessary to understand the underlying accumulation of elements and trajectories of practice to apply respective interventions that address them to evoke change (Shove et al., 2012). In this sense, this thesis makes a novel contribution to the understanding of everyday recycling practices and some of the

reasons for their under-performances to form transferable lessons. This section summarises key contributions and transferable lessons regarding household kerbside recycling (Section 6.5.1), political and education interventions (Section 6.5.2), and container deposit schemes (Section 6.5.3) to address the overarching focus of this research.

6.5.1 Household Kerbside Recycling

The ability to 'zoom in' (Nicolini, 2009) on the underlying elements of household kerbside recycling practice enable an analysis of how elemental dynamics of underperforming practice are likely to unfold. This thesis reveals that the core performance of household kerbside recycling, namely waste sorting and separation, is a practice that happens mostly subconsciously, in an automated, reflexive manner. Therefore, this study supports what is apparent in the literature, namely that the core performance of recycling can be classified as a practice-as-performance (Schatzki et al., 2001). In this context, this study provides evidence of underlying drivers and barriers to the practices-as-performance that can be clustered into elements of meaning, competence, and material (Shove et al., 2012) to address RQ 1.

In the context of drivers that positively impact kerbside recycling, this study provides a key contribution by analysing the positive impact of the Covid-19 pandemic on meaning through a SPT lens. This positive impact is linked to a strengthened collective meaning of pro-environmental practices amongst residents. Due to the disruption of the pandemic, over one-third of residents re-evaluated some of their environmental practices and by perceiving a need to change them, have cultivated a new sense of environmental conscience, leading to the adoption of new environmental practices (Cleanaway Waste Management Limited, 2022). This is confirmed in the Australian context by Beasy and Gonzalez (2021), who identify a positive correlation with the pandemic and the value of sustainable practice within communities. This finding indicates the development of new patterns of thinking and by implication the adoption of new goals and new behaviours (Dweck & Leggett, 1988). In line with research by Shove and other contemporary practice theorists (see Chapter 3), changes to more sustainable practices do not simply follow from increasing environmental awareness

or restoring confidence. The pandemic seems to have strengthened residents' connectivity to their local environment, with new behaviours closely tied to the symbolic importance of their involvement in more sustainable practices to protect the local environment. For example, Beasy and Gonzalez (2021) find that threats like the pandemic can trigger new aspirations and practices, in this case sustainable practices formed during the pandemic. Such new aspirations have the potential to diffuse and be widely shared amongst communities, holding people together via shared practices (Wenger, 1999). This observation also closely relates to Bourdieu's (1984) concept of habitus in that disruptions of the social milieu can lead to the reconsideration of behaviours (e.g., environmental practices), illustrating that social change can happen at any time and is not always directly influenced by education or policy.

In the context of barriers to household kerbside recycling, this research postulates that the inefficient nature of its core performance (a lack of sorting and separation skills) is in fact impacted by materiality, over which an individual has no control (see Figure 6.1) and therefore is not itself behavioural-related. While good household kerbside recycling outcomes require correct source separation (Kaufman et al., 2020) and the motivation to participate in circular business models (from drivers such as social pressure) (Borrello et al., 2020), it is in fact materiality (shaped by governments and industries) that is the key factor to success. Therefore, this research takes a different view to previous studies such as Moloney and Doolan (2017) that emphasise the behavioural aspects of recycling. This thesis does not place the onus predominantly upon residents to improve behaviours and separate waste from valuable recyclables appropriately in order to increase resource recovery. Instead, this research details prominent barrier elements and their linkages to explain the inefficient nature of the core performances triggered by the material world. This point of departure enables the further piecing together and visualisation of inefficient practice manifestations to provide an overview of the underlying connections between elements. In this context it could be argued that the identified flow-on effect of barrier materiality to meaning and competence is not made explicit in household kerbside recycling policy. A stronger acknowledgement of their interrelationships would be advantageous. Although the flow-on effect of materiality on meaning and competence is not explicitly identified in environmental policy, this thesis demonstrates that governments and environmental

practitioners typically have the highest ambitions to address materiality in the context of the research problem. However, without enforcement of some material objectives, critics forecast a lengthy period of market development that fails to make full use of Australia's potential to achieve a circular economy (Jones, 2020b). Based on these findings, this thesis posits that improvement of household kerbside recycling practice is not a one-off enterprise, nor is it one over which policy makers or environmental practitioners have ultimate control. In this sense, this study demonstrates the underlying complexity of household kerbside recycling practices.

6.5.2 Political and Education Interventions

Investigation of recycling initiatives through a practice lens facilitates understanding of why some political and education measures are more and some less effective in response to RQ 2. On the one hand, public messaging in the context of recycling that mostly relies on information and persuasion techniques appears to be less effective in the context of skill development. On the other hand, advanced practical measures such as bin tagging and the implementation of community connectors demonstrate high levels of effectiveness regarding improvement of the current quality and quantity of MSW feedstock. However, these advanced practical measures cannot be applied in every Australian LG due to their resource intensity. In the context of education measures, the practice perspective of this study reveals that there is a need for environmental educators to give special attention to the meaning of sustainable practice, for example by including the 'why' (the rationale for adoption) within public messaging and adopting more multi-sectoral approach approaches.

6.5.3 Container Deposit Schemes

Overall, the newly implemented WA CDS has enhanced recycling practices in Australia. In response to RQ 3, this thesis demonstrates that the decision to change existing practices to accommodate scheme participation in daily life often extends beyond the obvious 10 cent incentive, as people are driven by higher goals such as environmental and social benefits. However, multiple considerations and changes need to be made within the home for effective scheme participation (such as adjustments to in-the-home sorting, use of the kerbside system, making space, or

allocating time). As such, CDS participation is strongly interconnected with the existing 2-bin kerbside practice. Therefore, this thesis indicates that to achieve a high level of CDS scheme participation, it is necessary to address both higher environmental goals and to consider how the practice can be interwoven in people's wider socio-technical systems (e.g., the wider systems of consumption practices such as shopping or transport). It is thus important to not only understand what drives pro-environmental decisions but also where CDS performance decisions are located within the dynamics of existing household waste and recycling practices as well as other daily routines of consumption. In light of stagnating scheme redemption rates in WA, such a view prompts consideration of how other intersecting activities may impact on scheme participation, both intended and unintended. The complexity associated with interrelated practices as part of bundles of practice entities (Shove & Walker, 2014; Shove et al., 2012) should be included in the investigation of recycling behaviour more generally. Therefore, this research argues that in order to move the conversation of recycling forward, a better understanding of its linkages to systems of consumption practice would be beneficial (as outlined in Figure 3.2). Practice studies that build on the work of Shove (e.g., Bissmont, 2020b; Müller et al., 2022) inform the notion advanced here, namely that household recycling is embedded within a variety of consumption practices involving multiple integral routines primarily associated with food. Recommendations for future research in this context are provided in the following chapter.

6.6 Chapter Summary

This research contributes to a better understanding of household recycling practices by arguing that it is the role of Australian authorities to ensure that the interconnectedness of waste, recycling, and consumption practices visualised in Figure 3.2 is considered when developing WARR policies, interventions, and practical education measures. Practice theorists such as Shove (2003) have attempted to build an understanding of how to link values of one practice to other taken-for-granted practices to change cultural meanings of entire entities. In the context of Australian household recycling behaviours, this thesis identifies several attempts in this direction undertaken by authorities, such as linking shopping and daily disposal practices through the ARL (Australian Government, 2019). This can be considered an advanced

approach as it extends the symbolic meaning of the logo by giving it meaning not only when disposing of supermarket packaging, but at an additional point of consumption (shopping). This approach has the potential to serve as a constant reminder for pro-environmental practices, which is further discussed in the following chapter. Chapter 7 presents recommendations and additional research avenues for scholars, policymakers, and environmental practitioners.

Chapter 7: Conclusion

7.1 Chapter Overview

This thesis is premised on the understanding that the underlying dynamics of inefficient household recycling behaviours are best understood as social practices to inform the work of environmental practitioners, other collaborators, and the wider community. This chapter presents the key findings of this thesis (Section 7.2), outlines theoretical and practical recommendations (Section 7.3), and describes the overall contributions of this research (Section 7.4). The limitations of the study (Section 7.5) and future research directions (Section 7.6) are also discussed. Finally, Section 7.7 concludes with a chapter summary.

7.2 Key Research Findings from research areas

This thesis analyses household recycling practices utilising the Shovian SPT framework. New perspectives on household recycling derived from this approach build a novel foundation for examining the relationships between practices, policy, and education. Key findings in the context of yellow bin kerbside recycling and CDS practices, including their relation to policy and education, are outlined below.

7.2.1 Household Kerbside Recycling Practices

As shown in Figure 6.1, four types of inefficient materiality within the system negatively impact on the competence to sort and separate recyclables correctly. Historically, these material barriers have emerged due to varying industry standards and a lack of federal government leadership (Australian Government, 2021) and therefore cannot be directly influenced by residents. This inefficient materiality causes a flow-on effect on competence and meaning over which the individual also has little control. Prior to impacting on the competence of recycling, inefficient materiality negatively impacts on the meaning of the practice (e.g., by causing confusion or the feeling of having to make an extra effort). However, most Australians still report that practicing recycling is important to them (Cleanaway Waste Management Limited, 2022).

Although household kerbside recycling practices regularly emerge through the recursive linkage of material, competence, and meaning, residents' intentions to be

good recyclers are largely undermined in practice. The federal government has set the ambitious goal to support state and territory governments to address material barriers, for example by harmonising kerbside recycling collection standards. However, this goal is not mandated, which contributes to an ongoing degree of inefficiency in consumer education, operating standards, waste governance, and waste data collection (CSIRO, 2021). Without stronger national leadership, such inefficiencies are seemingly hard to overcome, rendering improvement of household kerbside recycling a slow process.

7.2.2 Container Deposit Scheme Practices

In order to participate in a CDS at the household level, it is necessary for residents to extend their existing kerbside sorting practices by collecting beverage containers in a separate receptacle (such as a crate or bag) in order to keep them out of the kerbside system. In the case of the WA CDS, while many residents collected and returned containers once, they did not persist with the practice, thus failing to establish the required new practice entities binding the recycling of containers to the wider kerbside system. Therefore, existing kerbside recycling bins act as a competitive element to scheme participation.

The field study results reveal a reverse tendency for scheme participation in low socio-economic vis-à-vis affluent areas. Due to higher container return rates in low socio-demographic areas it has been shown that socio-demographic backgrounds have a significant impact on the adoption of CDS practices. It can be assumed that in affluent areas there might be a higher validation of the convenience of the kerbside system and a higher financial validation of the 10-cent incentive offered per eligible container in low socio-economic areas. In affluent areas, this partly explains why the attempt to substitute existing household kerbside recycling with CDS practices is partly failing. However, the field study has also shown that many residents value the social and environmental benefits of CDS.

Next to the convenience of the kerbside system, two common barriers also hindering the uptake of CDS practices: a lack of space (especially at MUDs) and a lack of time

(taken up by performing other practices that compete with changing recycling behaviours).

When residents participate in CDSs, the practice offers the ability to build back trust in the Australian recycling system. At the level of meaning, this research has shown that emphasising on building the collective norm to make the additional effort to participate in the scheme can be fruitful for an early-stage recycling scheme such as in WA.

7.3 Research Recommendations

This thesis makes four recommendations with the aim to move the conversation of practice-based intervention strategies forward. These concrete examples seek to contribute to future discourse within the Australian WARR industry. This thesis identifies that four material elements, which cannot be influenced by residents, play a crucial role regarding the underperformance of recycling practices. Therefore, it is necessary for practice-based studies to consider 'different geometries' (Higginson et al., 2015, p. 954) of practice elements, not only including the frequency of linkage with other elements but also their weight in terms of having a positive or negative flow-on effect on linking elements of practice. Given the current state of flux of the Australian WARR industry, the industry is likely to be amenable to practice-based interventions. Consequently, the theoretical stance of SPT is beneficial not only because of its paradigmatic differences to traditional models of behaviour change, but also due to its strong call for 'serial adjustments' and the unique position of policymakers to make such adjustments. Therefore, this research proposes that the Australian context increases the capacity to adopt SPT-informed interventions owing to the indications of broader political change in environmental policy.

The recommendations outlined in Sections 7.3.1- 7.3.4 are built on the three practice-driven intervention designs outlined by Strengers and Maller (2015) and specifically focus on changing the combination of practice elements (e.g., by recrafting the pattern and weighting of practice elements). Therefore, these recommendations identify practice-based pathways that merit consideration by environmental practitioners to encourage people to adopt, repeat, and maintain more consistent and continuous household recycling practices. However, these recommendations do not incorporate

the exploration of adequate human, technical, and financial resources required for implementation; such resources should be verified in an independent assessment.

7.3.1 Recommendation 1: Recrafting Household Kerbside Recycling

This research demonstrates that even though the rates of kerbside recycling are underperforming, the practice of recycling is incorporated in many Australian metropolitan households. However, the inefficiency of the practice indicates the requirement to recraft multiple of its elements (see Chapter 6, scenarios 1 - 4). As discussed in Chapter 3, recrafting practice means reconfiguring performances by targeting single elements through interventions, such as replacing outworn materiality with innovations (Shove et al., 2012). This recommendation proposes the recrafting of a selection of inefficient material, competence, and meaning elements in the context of kerbside recycling to improve recycling outcomes. Due to the identification of materiality as the source of underperforming practice, it is imperative to address it first, before moving recrafting endeavours on to competence and meaning. This resonates with Breadsell et al. (2019), who argue that established practices are difficult to change via information (addressing competence) and persuasion techniques (addressing meaning) only. Rather, a change of materiality can cause a positive flow-on effect on existing practices to help build new competence and meaning. Although more complex to address, utilising a multi-dimensional approach like this to recraft practice is considered more effective.

Firstly, the federal government should focus on *achieving a nationally coherent kerbside recycling system*. Aligning materiality can prevent its negative flow-on effect on varying waste education (competence) and confusion (meaning) to improve the core problem of the lack of accurate sorting and separation skills (see Figure 6.1, scenario 1). The federal government should facilitate this task by creating a transparent process for stakeholders (MRF operators, LGs, waste collection companies, and local communities) to strengthen communication, collaboration, and alignment. For example, in a first step the federal government could build and share a database of existing MRFs and their current technologies. Within a guided framework of technical consultation, the government could then set minimum standards for

sorting technologies to be complied with by MRF operators. Funding could be provided by the federal government to MRF operators to implement such standards. Setting up mandatory minimum standards should incorporate the higher goal of aligning sorting efficiency to ultimately eliminate varying capacities leading to varying education, confusion, and a lack of individual competence. This thesis identifies a significant level of confusion, particularly surrounding soft plastic. When engaging with independent technical consultants to identify minimum standards, the federal government could also assign investigations regarding opportunities to incorporate the sorting technology for soft plastic at existing MRFs. This could improve the quality and quantity of yellow bin materials drastically. From a technical point of view, to achieve this upgrade, innovative AI-driven technology (such as that designed by the new Australian company Terex MP) could be adopted (Wheeler, 2023b).

Secondly, the federal government and key environmental stakeholders should maintain and expand up-to-date educational programs on recycling. For example, in the context of recycling education, it is recommended that the federal government and stakeholders involved in the ARL initiative expand their educational endeavours. To do so, this research proposes *an expansion of the scope of packaging carrying the ARL.* To date this is mostly supermarket packaging. Therefore, expanding the respective producer responsibility to more retailer categories (such as online retailers, takeaway food packaging, and delivery services) is recommended. The expansion could contribute to normalising the acceptance and use of the logo, contributing to the improvement of sorting and separation skills.

Thirdly, to address the meaning of recycling, it is essential to build back trust in the system and increase residents' validation of waste as a resource. Following negative publicity associated with the underdeveloped industry landscape for reprocessing and re-manufacturing of recycled materials, this is directly linked to building an industry landscape. During this process, governments should *showcase positive tangible and measurable examples of local recycling outcomes* to address residents' lack of understanding of the Australian system. For example, after the collapse of the RedCycle soft plastics recycling program at Coles and Woolworths, the Monash

Council implemented an alternative solution for their residents to continue the collection of soft plastic. While the initiative has been given some media attention within the industry (Wheeler, 2022e) and the local Monash council website (City of Monash, 2022), no other media has highlighted this positive example. If this local example were to be broadcast more widely, more councils could follow this approach, ultimately building back trust among residents. Advertisements of success stories ideally should be broadcast during peak household energy use hours (5pm to 9pm) (Breadsell et al., 2019), when people are cooking and subsequently most waste is generated and disposed of (Müller & Süßbauer, 2022).

7.3.2 Recommendation 2: Substituting Kerbside with CDS Practices

This recommendation involves substituting the stable performance of disposing drink containers through the kerbside system with the more sustainable counterpart of collecting them in a separate receptacle for drop off via CDSs to stimulate a cultural shift. As mentioned in Chapter 3, substituting old with new practices means re-configuring all three practice elements by discouraging old linkages and replacing them with new elements (Spurling et al., 2013). As proposed by Breadsell et al. (2019), this could start with a change of infrastructure or tools (changing material) to build new competence and meaning.

Firstly, in the context of materials, this research suggests that LGs and the CDS scheme coordinators should *provide free receptacles* for the collection of eligible drink containers to residents, similar to FOGO. In a practice context, the presence of material elements can impose a constant reminder to regularly perform a practice. Therefore, receptacles in the home or at shared bin areas can function as a stimulator to adopt or increase the practice of separating eligible drink containers from the remaining recycling stream. This research specifically suggests starting with providing in-the-home receptacles to residents at single-unit dwellings (SUDs)[54] and large bins

[54] This thesis does not identify spatial issues as a barrier to recycling at SUDs. Therefore, the inclusion of an additional receptacle for the separation and collection of eligible containers is a viable means of expanding the in-the-home waste system.

for the collection of containers at shared bin areas for residents at multi-unit dwellings (MUDs). The refund made from collecting containers from several households at MUDs could be donated or invested to improve the condition of shared areas at the property. Furthermore, at refund points additional bins for the disposal of items such as batteries or soft plastics should be co-located, as successfully implemented in South Australian depots. This has the potential to build interconnections between several recycling practices and to expand the competence and strengthen the meaning of recycling.

There are manifold reasons for not substituting the separation of containers with standard kerbside practices; however, the practice of disposing containers in some way remains non-negotiable. Therefore, at the competence level it is suggested that LGs provide more targeted *feedback to residents about the financial loss when not returning containers*. For example, feedback could be conveniently provided when undertaking bin tagging interventions (see Chapter 5) undertaken to reduce contamination rates in the recycling stream. During such interventions, LGs could potentially not only assess the level of contamination in the yellow bins and the level of recyclables ending up in red bins, but also investigate how many eligible containers a household disposes via the standard 2-bin system. On the foundation of this investigation, LGs could provide feedback about the approximate refund residents lose when not returning eligible drink containers (e.g., per week or month). This feedback might strengthen scheme participation in the future, especially in low socio-economic areas where the presentation of a financial loss (such as $5 per week) might have a strong effect. In affluent areas, feedback information might require modification in order to instead focus on the environmental and social benefits of CDS participation.

In the context of the meaning of CDS practices, this research proposes that in general, the social and environmental benefits of the practice should be more strongly emphasised. These benefits should be made explicitly clear by the scheme coordinator and local governments using tangible local examples outlining why making the additional effort to participate in the CDS — even if it conflicts with existing routines — is worthwhile. Providing such examples early in the process of scheme introduction

can strengthen links with other practice elements (e.g., provision of receptacles that serve as a constant physical reminder). Drawing on the work of Miliute-Plepiene et al. (2016), this thesis recommends specific emphasis on strengthening the social norm of scheme participation. This thesis specifically suggests that the CDS scheme coordinator builds on residents' validation of *donation recipients.* For example, this can be achieved at schools where containers can be dropped off in a donation bin while picking kids up from school (interconnecting practice). It is further suggested that *feedback should be provided locally to communities about the environmental and social benefits they have achieved from the donation of containers (e.g., weekly or monthly feedback)*. Such feedback could be publicly visible in the place of donation (e.g., through a sign panel that quantifies the amount raised). Promulgating collective effort can further be promoted by communicating success stories regarding the specific use of this money (e.g., investment in school team uniforms), showcasing the social benefits for the community. This could further strengthen the importance of collective scheme participation fostering a moral commitment and normalising CDS practices (Shove, 2003). However, strengthening commitment by combining returning containers with other activities does not always have to be built on environmental or social benefits. The financial incentive can further be capitalised on, for example by pointing to the useful conjunction of returning containers for cash before doing the weekly shopping practices.

7.3.3 Recommendation 3: Interlocking Kerbside with CDS Practices

This recommendation involves the separate collection of drink containers for CDS participation via the simultaneous introduction of a 3-bin kerbside system at the household level. This could create an interlocking nature of existing and new kerbside (red, yellow, and green bins) and new CDS practice entities[55] (see Figure 3.2). For example, new FOGO practices would spatially and temporally interlock with current 2-

[55] One spatial obstacle associated with this approach might occur at dwelling types with limited space for a 4-bin set up (indoor receptacles for red bin, yellow bin, green bin, and CDS collection). In metropolitan councils mostly populated by SUDs, this is less likely to be a limitation due to the availability of more space.

bin practices inside and outside the home. This offers several opportunities for environmental practitioners. Firstly, the interlocking process of increasing the number of bins for source separation, adopting new FOGO, and adjusting existing kerbside practices offers the opportunity to manifest a better foundation of judgement of current and new recycling practices in general. Secondly, learning a new skill (e.g., separating food waste) can help to highlight the pro-environmental benefits of increased in-the-home source separation and resource recovery. Based on the research findings, this can lead to positive re-negotiating of other practices such as participating in further recycling schemes. This indicates the importance of cross-sectoral education endeavours for stakeholders and collaborating government departments that influence the interwoven context of kerbside and CDS practices. This research specifically suggests that *LGs in collaboration with CDS coordinators should simultaneously promote the separation of drink containers when extending from a 2-bin to a 3-bin system*. Approaching and preparing this practical measure could be achieved through setting up a community of practice including staff members of several key organisations Wenger (1998). Specifically, the community could be established to work through the apparent drivers and barriers of CDS practices and further investigating the potential of an interlocking approach. The community could include LG public servants working in the FOGO department, members of the CDS coordinator and network operators, local community members, and community connectors. They could discuss topics such as the number and type of receptacles for material separation (material), how to develop and manifest skills (competence), and the promotion of collective commitment (meaning) to more waste separation.

Interlocking FOGO and CDS with the existing 2-bin system simultaneously can improve the dynamics of the entire entity by manifesting the perceived value of waste and the value of reducing one's environmental footprint. Additionally, in accordance with the observation that environmental consciousness has been strengthened as a result of the Covid-19 pandemic, the incorporation of two new separation practices at home may potentially create a feeling of satisfaction evoked by being able to generate a cleaner waste stream. It should be kept in mind that when executing an environmental campaign like this in Australia, environmental practitioners should give feedback about the positive outcome behind the initiative to ameliorate the identified

lack of trust in the system. This is likely to motivate residents to adjust or adopt other environmental practices (e.g., in the context of waste avoidance or the reuse of items) and create a strong foothold for pro-environmental practices through engendering a better system of kerbside and CDS practices.

Interlocking interventions (such as those exemplified above) require detailed planning, for example by following the five-step approach of Strengers and Maller (2015). Prior to a large-scale roll-out, strategies could be tested in single areas organised in a joint project between LGs introducing FOGO and the respective CDS coordinator and network operators for the area. In relation to the promotion of such an intervention, a multi-dimensional campaign including community workshops, public discourse, and social media promotion that builds on practice thinking could be employed. As outlined in the literature review, the introduction of more than one new practice at the same time is likely to reduce the "unsettling emotionality" (Gonzalez-Arcos et al., 2021 p. 49) of adopting another new practice as the desirability to modify an existing system has already been sparked.

Prior to starting to design an intervention strategy, a commitment at federal, state, and local government level to collaborate with the key operational stakeholders (e.g., kerbside collectors and CDS operators) should ideally be secured. Since there is a growing consensus that the design of intervention strategies should be undertaken in a consultative and interdisciplinary multi-stakeholder framework that melds social science, regulative and operational stakeholders, and community, such commitment is feasible. Accordingly, governments may also acknowledge that connections between everyday practice and the broader cultural, political, technological, and infrastructural realms are essential to achieve behaviour change[56] (Cooper et al., 2016; Jones, 2020a; Jones, 2020b). The example of the simultaneous promotion of the separation of drink containers while introducing FOGO could potentially be an

[56] The House of Lords Behaviour Change Report (2011) concludes that 'behaviour change' must be examined from multiple angles, as any single-approach strategy will fail to tackle the problems on a large scale (Spotswood, 2014).

initial step forward in the wider adoption of practice-based interventions, not only for LGs and CDS coordinators but for all kinds of stakeholders. The magnitude of such an undertaking involving the intervention and re-arrangement of practice elements and linkages across waste-related practices managed by multiple stakeholders cannot be underestimated; therefore, this research fully acknowledges the complexity and costs inherent in such an approach.

7.3.4 Recommendation 4: Educate Practice Thinking

Environmental practitioners emphasise the need to improve their own education as foundational to promoting better recycling practices, particularly by participating in science-driven education programs that would enable them to design more advanced behaviour change campaigns. This research recommends *teaching practice-based thinking* to Australian environmental educators. This proposal confirms the work of Moloney and Strengers (2014), who suggest that change agents (in the Australian context this could be waste educators, community connectors, or MUD caretakers) should be introduced to practice-based thinking to learn about this different conceptual framework for behaviour change. The teaching process could start by firstly introducing change agents to the role of driver and barrier elements to household kerbside recycling practices, such as those identified in this research. An understanding of the concept of practice-as-performance and practice-as-entity could help agents and teachers to explore interconnections between elements of disposal and recycling practices and other practices of consumption. This could help educators to better understand how to evoke change and develop feasible ideas for interventions.

For example, change agents may identify a *lack of trust in the system* amongst the local community. This could be targeted by focusing on sharing positive examples of recycling practice at a local scale with community members. This research suggests focusing on examples of the local effects of introducing FOGO and CDS. For example, by showcasing the use of the new local infrastructure (additional bins, depots) and addressing environmental and social benefits in a qualitative and quantitative manner. Tangible methods that address practice and strengthen green morals should be further

discussed and explored by change agents, for example through a practice-based working group to form more communities of practice that specialise on environmental education.

Small local initiatives should actively be assessed, and their results shared by change agents to determine the likelihood of the ongoing accomplishment of breaking unsupportive linkages. Generally, the probing of adjusting practices by breaking and making repetitive linkages through small initiatives can make change agents more responsive intermediaries for communities and their needs. Learning experiences from such activities to provoke change could be transformed into a transferable lesson and shared with other local change agents to increase the application of practice-based interventions (Shove et al., 2012). By reconfiguring or building community practices with trusted members of the community, community connectors as protagonists of change can build long-lasting commitment in residents. In this way practice change evolves by starting small and then transferring promising results to a wider range of agents for adoption. This bottom-up approach has significant potential for a successful diffusion of large-scale change within communities. To this end, consideration of valuable on-the-ground practice learning experiences for application to large-scale perspectives (e.g., by adjusting education materials to address social practices) is recommended.

7.4 Research Contributions

This research provides a range of theoretical and practical contributions. On a theoretical level, it firstly contributes to a growing body of literature that departs from purpose-oriented and norm-oriented theory to argue that there is value in exploring household recycling as a practice utilising SPT. Secondly, this research makes a novel contribution to the literature by developing a visual representation in line with Higginson (2015, 2016) and four scenarios to better understand inefficient kerbside recycling practices. This visualisation seeks to identify various forms of connectedness of elements and performance variations and thus make more tangible the root of inefficient performances. Thirdly, invoking SPT yet focusing primarily on barrier elements to recycling and their connectedness (rather than enablers to good practice)

represents a distinctive theoretical contribution. Specifically, the finding that four material elements build the starting point to a flow-on effect regarding inefficient recycling performance (Figure 6.1) is an important contribution of this research as it impacts the evaluation of what actions governments and agents should take in order to more effectively address the problem. Fourthly, building the practice-based investigation of recycling practices on a methodology that rests on qualitative data analysis to visualise results according to the Shovian concept of SPT, including consideration of the extended concepts of Kuijer (2014) and Higginson (2015, 2016), contributes more generally to the field of practice research. The triangulation of qualitative methods facilitates examination of the core of the problem prior to a conceptual breakdown of the data. In doing so, it is possible to confidently set aside peripheral elements of practice to focus on apparent connections and flow-on effects of certain barrier elements on other elements. Such an approach can enrich future research and discourse on the strengths and weaknesses of the marriage between SPT and various qualitative methodologies.

On a practical level, for environmental practitioners this research contributes to a clearer understanding of the root of inefficient yellow bin practices. On this basis, a range of arguments are developed, originating from material barrier elements (Figure 6.1) that provide clues as to which aspects of practice are more likely to be centrally involved in processes of change and stability. Furthermore, zooming out of yellow bin practices while giving consideration to plausible accounts of long-term trajectories within at-home waste systems and systems of consumption highlights the level of complexity in which household recycling is situated. This knowledge is fundamental to shedding light on the configuration of practice and is useful in relation to putting forward tailored recommendations for future interventions to guide performances and entities of practice, for example by shifting or altering contextualised elements (Halkier & Jensen, 2011; Hargreaves, 2012; Welch, 2016). The research recommendations set out in the previous section are likely to be beneficial to various environmental stakeholders such as waste influencers; federal, state and local governments; and industry. These practice-based recommendations should be implemented in line with the proposed design steps of Strengers and Maller (2015). By contributing ideas for practice-driven interventions, this research reinforces the value and need for an

alternative ontological framing of social change and serves as a reminder of the central role of environmental practitioners in relegating traditional theoretical positions in favour of alternative theoretical frameworks.

7.5 Research Limitations

While this research offers significant theoretical and practical contributions to the field of pro-environmental behaviour change in the context of household recycling, it also exhibits several theoretical (Section 7.5.1) and practical (Section 7.5.2) limitations.

7.5.1 Theoretical Limitations

Drivers and Barriers: The restrictions during Covid-19 that impacted the research scope limit the analysis and discussion to core driver and barrier elements to yellow bin recycling and CDS practices identified by experts (environmental practitioners) rather than residents themselves. The practitioners identified key material elements that cause different scenarios of ineffective kerbside recycling. However, in the context of SPT these core material elements have key flow-on effects on residents' core competence and meaning, a finding contributing to a better understanding of ineffective recycling practice.

Discursive Data: Hitchings (2012) notes that the use of discursive data can be challenging as it does not explicitly represent unconscious forms of embodied practice that can be accessed through observations. As Halkier and Jensen (2011) argue, observations of practitioners practicing a practice (e.g., via an ethnographic study) are often the preferred means to collect contextual information on a specific practice. However, in the context of this study (which started in 2019), while consideration was initially given to incorporating participant observation, it became clear — during the onset of the pandemic — that the methodology had to adapt to the external circumstances. Therefore, careful consideration was given to canvassing an extensive expert sample (42 interviews in Phases 2 and 3) in accordance with this identified limitation. Research on social behaviour canvassing an extensive expert sample is widely considered practical and reliable to produce narratives about social actions

(Atkinson & Coffey, 2003). In the context of the theoretical framework of this study, SPT, this represents a valid approach. In addition to broad scale analysis of secondary data, experts can convey a wide range of insights to explore practice, their structure, and linkages to other practices and current measures to drive social change (Spotswood et al., 2015). Therefore, applying interviews as the main source of data collection was considered appropriate to explore the social phenomenon under investigation.

7.5.2 Practical Limitations

Sample Size: Given the sample size, any generalisations of the findings in the context of both theoretical and practical contributions of this research are rendered tentative (Kaufman et al., 2020). Following Killam (2013), results from qualitative studies cannot be generalised, as a hypothesis is a quantitative term. This notwithstanding, the research presents a range of findings that point to valuable insights in the context of the research problem and offer useful signposts for further research. For example, the tendency of higher CDS return rates in low-socio-demographic areas could be further investigated via surveys specifically clustering participants into socio-economic groups. This could provide new insights on how scheme users might be recruited based on the socio-demographic location of the refund points.

Metropolitan Zones: A practical limitation was imposed by the varying household waste and recycling services in Australian rural and remote areas, compounding poor data collection methods. This research recognises the important need to improve services in these areas. Identifying such deficiencies led to the decision to focus on metropolitan areas, as they impose no need to compare practices due to a good coverage of the 2-bin service. However, there is a clear need for additional studies that focus on recycling behaviours in rural and remote areas including a focus on Aboriginal populations. This is further outlined in Section 7.6.

Complex Industry Landscape: At the beginning of Phase 1 (document analysis) a multitude of content containing relevant information in the context of the research problem was identified. As outlined in Chapter 2, during the past 4+ years — in response to the China Sword — there has been increased public and private interest

in adapting waste hierarchy principles with many core policies, environmental programs, initiatives, and work streams developed or updated under national and state-based agendas. This movement follows the long-term aim of Australia to transform to a circular economy (CSIRO, 2021). Within the scope of this thesis, it has not been possible to investigate all of the rich and rapidly developing content produced by the multi-level governance associated with the recycling industry. However, as outlined in Chapter 4, a careful selection of key WARR policy and strategy documents was undertaken. This notwithstanding, after the selection close attention was still given to new relevant evidence as it became available (e.g., media releases and progress reports).

Recruitment of Expert Informants: Despite the researcher's effort to engage with stakeholders from all states, during the recruitment process of experts for the interviews in Phase 2, it was only possible to include experts from six out of eight jurisdictions (no experts from Tasmania or Queensland were included). This might have generated an imbalance in the findings. A more representative and more evenly distributed sample (e.g., including more informants at the federal government level) would be advantageous. However, this study also analyses results from the latest national recycling survey, which was conducted in all Australian states and territories and includes an even sample of more than 1000 participants (Cleanaway Waste Management Limited, 2022).

Waste Data: There is a lack of available comprehensive historical waste data at state and national level, thereby hindering a more comprehensive description of the historical development of the research problem. Building and sharing reliable waste and recycling data via a unified national data collection policy has been proposed by the federal government. Also the author of the National Waste Report, Dr Joe Pickin, reported during a webinar on the 7th of February 2023, there is a need for "national standards for reporting that are adopted by the state and territories" (Appendix H, 5:14 minutes). Nevertheless, the latest National Waste Report (published December 2022) still does not provide comprehensive information in the context of contamination rates, MSW compositions, or common contaminants in the yellow bin stream. For example,

throughout this thesis examples of data on contamination rates vary from 10% to 40% per LG area. The availability of more comprehensive data on the yellow bin stream would strengthen the arguments in this thesis. The lack of historical waste data and the current collection processes impedes research on many levels, thus demonstrating further evidence of Australian waste and recycling practices being an under-researched field.

7.6 Future Research Directions

This thesis leads to a variety of ideas for future research, ranging from policy to recommendations for further investigations of currently applied practical measures. In the overall context of the under-researched field of Australian household recycling policy, there is a need to investigate effective models of waste regulation, e.g., by researching models in other countries that have stepped away from a stringent multi-governance approach. There is also a need to examine household kerbside recycling and CDS practices in rural and remote settings, including in Aboriginal and Torres Strait Islander communities, in order to expand the broader discourse of recycling behaviours.

In metropolitan areas, future studies could examine the inclusion of recycling standards in housing development policies and regulations. Shove et al. (2007) confirm that the set-up of in-home infrastructure is crucial for waste separation as well as generation. To the best of the author's knowledge, this is not a standard part of the conversation within the Australian housing development and recycling industries. For example, it would be worthwhile to investigate if new residential and commercial constructions should include a dedicated inside and outside space for recycling. This could go hand in hand with exploring the validity of mandating certain kitchen design elements for recycling at MUDs (see Chapter 6, scenario 3). This could mitigate the challenges relevant for MUDs, for example by including standard receptacles for general waste, co-mingled recycling, FOGO, and CDS practices within high population density environments. Here the local government could play a relevant role when approving new construction developments.

In the context of incentivising Australians to participate in CDSs, this thesis identifies a trend of high(low) participation in low(high) socio-demographic areas. However, to the best of the author's knowledge, there is limited research regarding this trend. If confirmed in further research, this insight could facilitate targeted education initiatives that consider potentially varying drivers in different socio-demographics. This could be an interesting point of departure for further practice-based interventions. Whether it would be worthwhile to increase the deposit value also merits further exploration in the context of its effects on different socio-economic areas.

This thesis also points to future potential research to measure the effectiveness of two policy-driven practical measures recently implemented within the context of the rapidly evolving discussion on how to improve household kerbside recycling. Firstly, WA's policy initiative to align recycling rules merits investigation. While the state has aligned their rules between LGs (via an A-to-Z list), such recycling rules are still complex. To further mitigate obstacles for the correct practice of household kerbside recycling, this research proposes the investigation of the effectiveness of the initiative and its promotional efforts. In the context of the results of such research, it should be kept in mind that WA's metropolitan household kerbside recycling stream is processed through two MRFs. As there are a total of 94 MRFs operating in Australia (DEE, 2018), not every state runs under such conditions (e.g., NSW and VIC have a significant higher number of MRF operators). Therefore, the approach to align rules prior to aligning technical standards is unlikely to be amenable to duplication everywhere. However, in states that sort household kerbside recycling materials through a small number of MRFs (e.g., the Northern Territory or Tasmania), the initiative should be duplicated and become a valuable contribution to the improvement of residents' recycling skills. The translation of knowledge and experience from WA for other states could therefore be of particular benefit. Secondly, for states that service household kerbside recycling through multiple MRFs, this research suggests that investigating NSW's new approach to align services through their joint procurement facilitation services would be of merit. By pioneering a system to build 'Aligned Collection and Sorting Infrastructure', the NSW government may build a potential lever to also align education insofar as the alignment of waste services between several LG

authorities can reduce the need for varying messaging across communities. If the initiative is feasible and financially viable, other states with a multitude of MRF operators (e.g., Victoria) could duplicate this approach.

In the context of further practice-based research, it would be advantageous to capitalise on the potential interconnectedness between the existing 2-bin system, the introduction of FOGO, and the adoption of CDS practices. The inner circle of Figure 3.2 can be used as an aid to discuss further research needs, as it maps out the major connections under examination. This research proposes three examples that could be the focus of future research. Firstly, future studies could investigate how residents dedicate space and time to a growing kerbside system (3-bin system) and the option to include CDS in their daily routines. Secondly, research could investigate if the introduction of FOGO causes a noticeable reduction of contamination rates in yellow bins and, from a practice perspective, how learning and practicing new (FOGO) separation behaviours can have a positive impact on sorting and separation skills for yellow bin recycling. Thirdly, in a broader sense, it would be of interest to examine how the introduction of new sustainable at-home practices can offer an opportunity to investigate if and how the meanings of several recycling practices may interconnect. By building such an interconnection (including links that constantly reproduce) residents might be willing to compromise time and space to incorporate FOGO and CDS practices into their daily life. Overall, the interconnection between environmental consciousness and perspectives on space and time as well as broader engagement in sustainability thus merits investigation.

As shown in Figure 3.2, recycling practices sit within wider systems of consumption linked through co-location and co-dependencies. It appears vital to investigate the wider trajectories of recycling practices within other systems of consumption in order to strengthen the understanding of linkages. For example, researchers could analyse the ways in which household recycling practices interlock with e.g., shopping practices, linking through a wide range of shared elements (such as packaging). This could help to further visualise loosely and closely interconnected consumption practices, thereby pointing to the complexities underpinning social life (Shove et al.,

2012). Such complexities offer a range of opportunities. For example, following Cochoy and Grandclément-Chaffy, (2005) the introduction of recyclability information on existing packaging has the potential to become a new criterion for consumer product choices. This could also influence recycling behaviours. A visualisation of such complexities and their potential for pro-environmental behaviour change could be presented in a multi-element network map, such as through a force atlas as applied by Higginson et al. (2016). Such a network map could include change points, a practice-approach suggested by Watson et al. (2020) to outline the complexities of daily practices for policy improvement. The change point concept is not discussed in the context of this research as the focus is on three other practice-based intervention strategies applied in multiple SPT studies (Spurling & Mcmeekin, 2015). However, the practice-based work of Higginson et al. (2016) related to food waste may be a good starting point for the adoption of such a concept for the end of life of solid recyclable materials.

More research on how recycling sits within the wider systems of consumption can also help campaigns (such as the ARL campaign) to produce more multi-dimensional content, for example by exploring the interconnectedness of packaging with the temporal organisation and spatial arrangement of several practices such as cooking or storing that lead to waste disposal (close connection) (Shove et al., 2012). Such research in the Australian context could help APCO to factor into their education possible competition for reading the logo. Such competition could be addressed and rendered advantageous for recycling practices.

This thesis reveals that there is a lack of research in the context of how to promote the purchase of consumer packaging made from recycled content. It would therefore be beneficial to explore opportunities to promote Australian recycled consumer packaging by building the interconnection to at-home recycling behaviours. Exploring the interconnection of consumers' daily production of feedstock for recycled products via at-home recycling and their intentions behind the purchase of recycled products may yield new insights for the ARL behaviour change intervention, which has been of limited success to date (see Chapter 5). This study and other research demonstrates that Australians value 'Australian made products' (Australian Made, 2020). Future studies investigating a possible similar validation for 'Australian recycled products'.

Such a validation could potentially also benefit recycling behaviours correct recycling is the foundation to make products from recycled material. Hence the validation of Australian recycled products and further promotion of the connection between recycling behaviours and the production of recycled products could work against people's mental disassociation from waste as a resource. Undertaking research in this context may lead to recommendations that cut across different areas of policymaking, thus necessitating an interdisciplinary intervention design (which often poses a major challenge for policy makers (Strengers & Maller, 2015).

7.7 Final Considerations

This thesis demonstrates that there is significant potential for Australian governments to build a mature industry and shift from a linear to a circular economy. However, at this juncture, and despite ranking WARR high on the political agenda, the utilisation of this potential is far from optimal. Much remains to be done to reach the point where Australians come to view waste as a source of value to be harnessed rather than as a burden to be dismissed.

In the context of the research problem, this thesis posits that greater awareness and more effective implementation of household recycling practices can be achieved through gaining a better understanding of the construct of practice. The analysis of empirical data bearing on the overarching focus of this research and the three research questions yield a range of insights in relation to the complexity of mundane household recycling practices and their single and interlocking characteristics with other practices, contributing to the daily loss of valuable resources. Efforts to understand and improve household recycling are widespread, with governments actively engaged in redefining environmental practices (for example by promoting circularity such as via CDS or FOGO) that are intended to encourage communities to improve or challenge the status quo. However, in order for large-scale change to occur, this thesis argues that when viewing society as populated by social practices co-constituted by structure and agency, a far greater consideration of social life and the stakeholders that shape it is required. This conception entails a significant challenge in shifting and transforming everyday life (Moloney & Strengers, 2014).

Nevertheless, this analysis offers a point of departure to generate a deep and profound understanding of household recycling practices, which can be synthesised to provide a framework to form ideas and concepts for sustainable change as well as to monitor and evaluate progress in the context of the research problem over the long-term. Insights from this research can also increase awareness of the need for more cooperative and collaborative relationships amongst stakeholders and within a multi-level governance framework, which in turn may lead to more interdisciplinary and multi-dimensional approaches rather than single component concepts. This thesis offers several suggestions on how to continue this journey, thereby pointing to how a practice-driven discourse on household recycling can frame innovative intervention strategies, thus challenging conventional paradigms of change. On the highest-level of desire for pro-environmental change - waste avoidance - the research at hand opens the way for further research on addressing the complex task of transforming our lives to become less consumption-oriented.

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Appendices

Appendix A: Ethics Approval

THE UNIVERSITY OF NOTRE DAME AUSTRALIA

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1 October 2020

Dr Alessandro Bressan & Susann Noé
School of Business
The University of Notre Dame Australia
Sydney Campus

Dear Alessandro and Susann,

Reference Number: 2020-155S

Project Title: "Environmental practice change: Applying Social Practice Theory to promote recycling behaviour in Australian households."

Your response to the conditions imposed by a sub-committee of the University of Notre Dame Human Research Ethics Committee (HREC) has been reviewed in accordance with the *National Statement on Ethical Conduct in Human Research* (2007, updated 2018). I am pleased to advise that ethics approval has been granted for this proposed study.

Other researchers identified as working on this project are:

Name	School/Centre	Role
Dr Felicity Rawlings-Sanaei	Classroom of Many Cultures	Co-Supervisor

All research projects are approved subject to standard conditions of approval.
Please read the attached document for details of these conditions.

On behalf of the Human Research Ethics Committee, I wish you well with your study.

Yours sincerely,

Dr Natalie Giles
Research Ethics Officer
Research Office

cc: Dr Zahid Hasan, SRC Chair, School of Business Sydney

Broome Campus 88 Guy St (PO Box 2287) Broome WA 6725
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Appendix B: Participant Information Sheet (Phase 2)

Research topic

Environmental Practice Change: Applying Social Practice Theory to promote recycling behaviour in Australian households.

Dear Study Participant

You are invited to participate in the research project described below.

What is the project about?

The research project investigates household waste disposal and recycling practices in light of the acceptance of recycling schemes promoted by the Australian Government.

The scope of this research is defined through the following questions:

- How do Australian households practice waste disposal?
- What are the barriers to at home recycling?
- What pro-environmental behaviour change (PEBC) programs designed to influence households waste disposal practices are applied?
- How do PEBC programs impact household waste disposal practices?

Who is undertaking the project?

This project is being conducted by Ph.D. Candidate Susann Noé from the School of Business at The University of Notre Dame Australia, under the supervision of Dr Alessandro Bressan and Dr Felicity Rawlings-Sanaei.

Why have I been asked?

You have been invited to participate in this study because you have been identified as an expert in the field of environmental education and/or waste management and resource recovery. Your contact details were either available publicly or obtained from a voluntary referral within the researchers' professional network.

What will I be asked to do?

If you decide to participate, you will be invited to take part in a semi-structured interview that will take approximately 45 minutes of your time. The interviews will be conducted face-to-face, on-line or via telephone. You will be asked about your insights and observations of the waste and recycling behaviour of Australian residents and with your consent, will be audio recorded. I may present models or findings to assist with this discussion.

Are there any risks associated with participating in this project?

1] There are no specific personal risks anticipated with participation in the interview. However, if you find that you are feeling uncomfortable or becoming distressed you can leave the interview at any time.

2] There are no specific professional risks anticipated with participation in the interview. Due to the fact that your information will remain anonymous there are no risks for reputational damage to you or your institution / organisation / group.

3] Further concerns: You may be concerned that your experiences are not reported or captured in the way that you intended; if you are concerned about this, you may request to review a transcript of your recorded

interview and pass on any feedback/corrections to the researcher.

What are the benefits of the research project?

The aim of the study is to understand people's daily waste disposal and recycling practices and investigate existing PEBC program strategies and measures. The comparison between existing social practices and applied program measures can help future environmental campaigners to better address barriers to PEBC.

What if I say no or change my mind?

Participation in this study is completely voluntary. Even if you agree to participate, you are free to withdraw from further participation at any time without giving a reason and with no negative consequences. You are also free to ask for any information which identifies you to be withdrawn from the study.

If you wish to withdraw from the study once it has started please contact:

Susann Noé, at (susann.noe@my.nd.edu.au) or (+61 481 150 477)

Will anyone else know the results of the project?

By signing the consent form, you consent to the research team collecting and using personal information about you for the research project. All this information will be treated confidentially. This confidence will only be broken if required by law.

Data about your person will be de-identified and stored on a secure server provided by the School of Business at The University of Notre Dame Australia's (UNDA). The server is compliant with UNDA' research regulations. The data will be stored for at least a period of five years. The data may be used in future research, but you will not be able to be identified (if applies). The results of the study will be published as a thesis.

Will I be able to find out the results of the project?

Once we have analysed the information from this study we will provide you with a summary of the results prior to publishing the final thesis. The final thesis is expected to be published in August 2022.

Who is supporting this research project:

The Department of Water and Environmental Regulations (DWER), Western Australia and The University of Notre Dame Australia are supporting this research project.

Who do I contact if I have questions about the project?

If you have any questions about this project, please contact Susann Noé at +61 481 150 477 or susann.noe@my.nd.edu.au. Alternatively, you can contact the principal supervisor Dr Alessandro Bressan +61 2 8204 4168 or alessandro.bressan@nd.edu.au. We are happy to discuss with you any questions you may have about this study.

What if I have a concern or complaint?

The study has been approved by the Human Research Ethics Committee at The University of Notre Dame Australia (approval number 2020-155S). If you have a concern or complaint regarding the ethical conduct of this research project and would like to speak to an independent person, please contact Notre Dame's Research Ethics Officer at (+61 8) 9433 0943 or research@nd.edu.au. Any complaint or concern will be treated in confidence and fully investigated. You will be informed of the outcome.

How do I sign up to participate?

If you are happy to participate, please sign the consent form and e-mail it back to me.

Thank you for your time. This sheet is for you to keep.

Yours sincerely,

Susann Noé

Appendix C: Participant Consent Form (Phase 2)

Thesis topic: Environmental practice change: Applying Social Practice Theory to promote recycling behaviour in Australian households

- I agree to take part in this research project.
- I have read the Information Sheet provided and been given a full explanation of the purpose of this study, the procedures involved and what is expected of me.
- I understand that I will be asked to: participate in an interview (face-to-face or online)
- The researcher has answered all my questions and has explained possible problems that may arise as a result of my participation in this study.
- I understand that I may withdraw from participating in the project at any time without prejudice.
- I understand that all information provided by me is treated as confidential and will not be released by the researcher to a third party unless required to do so by law.
- I agree that the interview will be audio recorded.
- I agree that any research data gathered for the study may be published provided my name or other identifying information is not disclosed.
- I understand that research data gathered may be used for future research, but my name and other identifying information will be removed.
- I am aware that I can contact Susann Noé (+61 481 150 477) if I have any concerns about the research.

Name of participant			
Signature of participant		Date	

- I confirm that I have provided the Information Sheet concerning this research project to the above participant, explained what participation involves and have answered all questions asked of me.

Signature of Researcher		Date	

The research is partly funded by the Department of Water and Environmental Regulations Western Australia (DWER). The researcher will undertake steps to ensure that the collection, analysis and interpretation of data is not affected by the funding party and that the conducting, evaluation and reporting of research is not compromised.

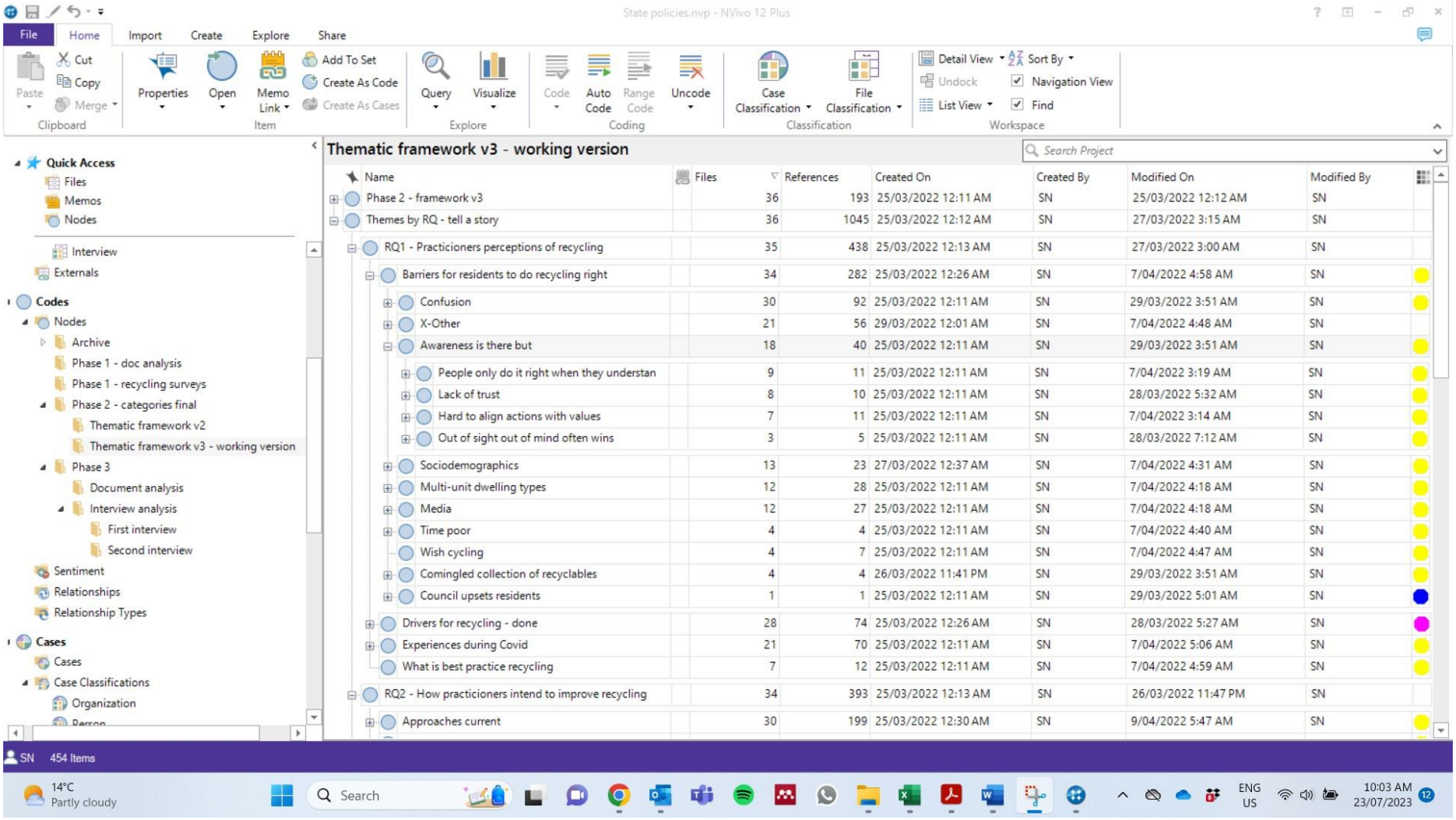
Appendix D: Interview Schedule (Phases 2 and 3)

Overall research focus: How can social practice theory contribute/influence the understanding of household recycling practice in Australia?

Warm up				
What is your professional background and current role? What was your motivation to specialise in WMRR?				
RQs	**No**	**Interview Questions (Phase 2)**		**Interviews Questions (Phase 3)**
1. What are the a) drivers of and b) barriers to household kerbside recycling practices?	1 2 3 4 5 6 7 8	How do you define at home recycling practices? What is best practice recycling? What are the drivers to recycling? What are the barriers to recycling? How much do communities engage in conversations about recycling? Do you think recycling reflects an individual choice or a shared social convention? How much does media impact recycling behaviours? How did Covid-19 (working from home) impact recycling practices?		
2. What are the perceptions of environmental practitioners in relation to a) policy and b) practical measures that seek to improve household kerbside recycling practices?	9 10 11	What are environmental practitioners doing to improve recycling practices? Does recycling intersect with practices such as cooking, cleaning shopping etc and what could be changed to improve recycling? What is the best way to achieve behaviour change?		
3. In what ways can newly implemented recycling schemes such as the Western Australian Container Deposit Scheme contribute to the enhancement of recycling practices?	12 13 14	To what extent, if any, do CDS contribute to a positive behaviour change? What are drivers to participate in recycling schemes such as CDS? What barriers to participate in recycling schemes such as CDS?	1 2 3 4 5 6 7	How has CDS been further rolled out in the last 6 months? Do you think the last 6 months were a success or a failure, and why? What were the drivers for success/ failure? How could things have been done differently and why? Does the scheme need more education, infrastructure, or incentives to be promoted? Do you think people build a timing and frequency into their existing routines to use recycling schemes? Will using CDS make people think about using other schemes too?
Interview questions not directly related to RQs	15 16	Are there any discrepancies between existing environmental policies and legislations, and behaviour change required?	8 9	WA strategy talks about the importance of changing practice. What does that mean in your opinion? For better recycling outcomes who should change practices and how?

		Should there be more collaboration and if yes which disciplines should work closer together?		

Appendix E: Barriers to Recycling (Phase 2). This screenshot provides an example of barrier themes and sub-themes in the context of household kerbside recycling behaviours that emerged from Phase 2.



Appendix F: Communication Tools and Behaviour Change Concepts

Table F1: Tools and Channels for Environmental Education

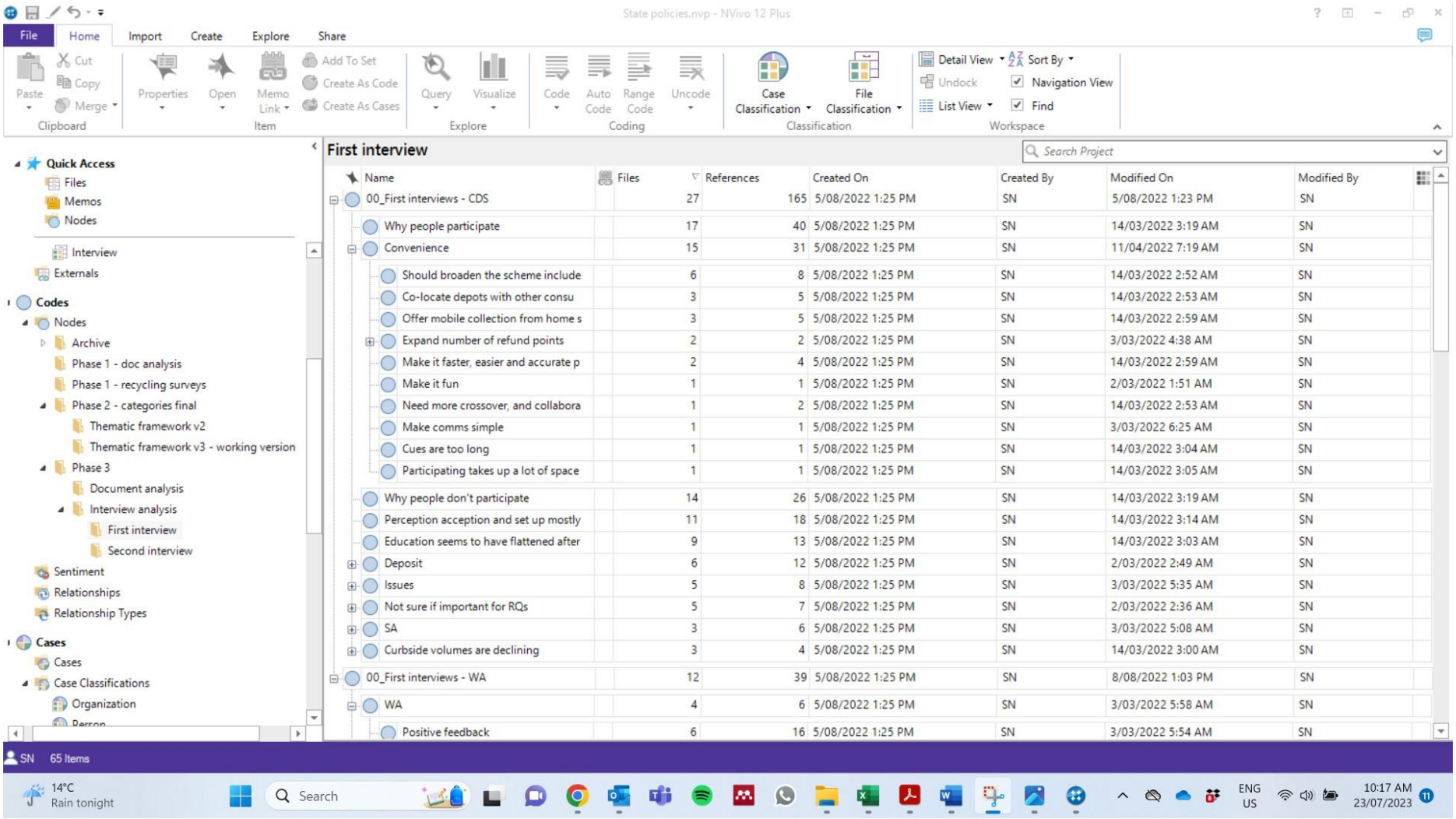
Flyers	Target migration centres	Eco birthday parties
Stickers	Website content	Presentations to community
Toolkits	Social media	Interactive courses
Signage	Gaming	Gamification
Household waste guide	Workshops	Posters

Table F2: Behavioural Concepts for Environmental Education

Behaviour Change Concept	**Example from expert informant**
Empowerment	Empowering people by giving them the opportunity to be involved in decision-making processes.
Self-identification	Behaviour change is more enjoyable when the process creates compliance through self-identification with others e.g., co-workers or other community members wherein "social norming means people will look to others to see how they're doing" (Inf-016).
Peer pressure	To make effective change it is *"important to make it harder to do the wrong thing"* (LG-023). Next to applying penalties this can be achieved by social or peer pressure, for example by *"making bad recycling behaviours look unattractive"* (LG-003). Inf-037, a nationally well-known environmental consultant, added it is important to tell people *"how to live their lives without being bossy which is what creating peer pressure is good for"*.
Competition	Letting people know how well they recycle compared to other communities (benchmarking), e.g., via the local paper.
Emotional engagement	For example, via informing residents that at the MRF there are staff members physically sorting through their waste.
Intergenerational equity	Putting forward intergenerational arguments (e.g., landfilling or other concepts) that have a negative effect on our environment becoming a liability to our children and future communities.
Positive reinforcement	Positive reinforcement instead of negative messaging is viewed as being more successful. This is also confirmed by research undertaken by the WA government (SG-004).
Incentivisation	E.g., CDS explained in Phase 3.
Moving environments	A significant opportunity for PEBC: *"When residents are moving into a new environment, it becomes a perfect time to change behaviour, because we can set up new behaviours from the get go"* (Inf-016).
Personalised feedback	In this increasingly digital world, people miss human contact and interaction. Personal engagement is viewed as one of the most powerful concepts. However, it is challenging

	to apply due to its resource intensity (Ind-036; LG-018).

Appendix G: Additional Barriers to CDS Participation. This screenshot presents examples of additional barriers that emerged from the NVivo coding process.



Appendix H: National Waste Report Webinar (2022)

WMRR's National Waste Report (NWR) 2022 webinar on Tuesday, 7 February 2023, featured lead author of the report, Blue Environment's Dr Joe Pickin. The NWR is issued every two years and serves as an “authoritative collation of national waste data in Australia, based on information provided by the states and territories and various industry sources.” The webinar can be accessed via:

https://www.wmrr.asn.au/Web/Shared_Content/Events/Event_Display.aspx?EventKey=NAT_221212