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# Creating a digital customer journey for plastic additives: a case study in the mechanical recycling market

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*To my parents, my brothers and sister.*

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*"Nature teaches more than she preaches. There are no sermons in stones. It is easier to get a spark out of a stone than a moral."*

*John Burroughs*

## ABSTRACT

This work collected voices of main stakeholders in the plastic industry and viewpoints on key topics, such as unstable politics, the Brazilian Environment fragile legislation, deficiency in waste infrastructure, and recycling technology gap. To develop a digital customer journey for relevant stakeholders in the plastic recycling market, a qualitative study with eight interviews in South America was conducted. The study includes market analysis, persona development and a customer journey for this persona. The interviews provide insights on informal waste collectors and governance collaborations in South America. It seems that this is a main influencing factor in the plastic value chain for an efficient recycling system. Today, startups and businesses address the recycling challenge differently. Plastic additives can support companies to solve the recycling challenge by enabling stakeholders' packaging concept and processes. The support stays in the technology sphere while marketing supports in communicating the right value proposition to the market.



Keywords: Digital Marketing. Mechanical Recycling. Persona Development. Customer Journey

## RESUMO

Este trabalho coletou vozes dos principais stakeholders da indústria do plástico e pontos de vista sobre temas-chave, como a instabilidade política, a frágil legislação ambiental brasileira, a deficiência na infraestrutura de resíduos e a lacuna tecnológica em processos de reciclagem. Para desenvolver um *customer journey* para públicos relevantes no mercado de reciclagem de plásticos, foi realizado um estudo qualitativo com oito entrevistas na América do Sul. O estudo inclui análise de mercado, desenvolvimento de persona e um *customer journey* para essa persona. As entrevistas fornecem insights sobre coletores de lixo informais e colaborações de governança na América do Sul. Há evidências de que este é o principal fator de influência na cadeia de valor do plástico para um sistema de reciclagem eficiente. Hoje, startups e empresas enfrentam o desafio da reciclagem de forma diferente. Os aditivos de plástico podem ajudar as empresas a resolver o desafio, auxiliando no conceito e nos processos de embalagem das partes interessadas. O suporte dos aditivos fica contido na esfera tecnológica enquanto marketing comunica a devida proposta de valor do produto ao mercado.



Palavras-chave: Marketing Digital. Reciclagem Mecânica. Desenvolvimento de Persona. Customer Journey

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| | |
|---|---|
| ABIPLAST | Brazilian Plastic Industry Association |
| ABRE | Brazilian Packaging Association |
| AIDA | Attention Interest Desire Action |
| B2B | Business-to-Business |
| B2C | Business-to-Consumer |
| CEMPRE | Coordinating Reverse Logisitcs & dedicated to Recycling promotion |
| EPR | Extended Producer Responsibility |
| EU | European Union |
| FGV | Fundação Getúlio Vargas |
| IT | Information Technology |
| MMA | Ministry of the Environment |
| NGO | Non Governmental Organizations |
| PA | Plastic Additives |
| PCR | Post-consumer Recycled |
| PEMRG | PlasticsEurope Market Research Group |
| PEST | Political, Economic, Social and Technological |
| PICPlast | Plano de Incentivo à Cadeia do Plástico |
| PNRS | The National / Brazilian Solid Waste Management Policy |
| SWOT | Strengths, Weaknesses, Opportunities, Threats |
| USP | University of São Paulo |
| WPO | Waste Picker Organizations |

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# 1 INTRODUCTION

This work will be presenting the complexity of new business development on the plastic value chain, focusing on mechanical recycling. This paper unites technical chemical solutions with digital marketing on a business-to-business (B2B) level and the reader will be navigated through the necessary processes to elaborate a customer journey as well as the possibility to achieve new markets and create leads with digital marketing tools.

An introduction is provided on how Company X impacts the Plastic Industry before sketching how this journey will be developed. A study is conducted in parallel to evaluate the current needs in the recycling market and how a chemical additive provider can positively impact plastic circularity.

This study delivers an academic work with the aim to obtain the diploma of a production engineer for the Polytechnic School at the University of Sao Paulo (USP). With the Production Engineering field methods, it is possible to analyze the whole value chain as one system or process, design a customer journey for this system, plan the first approach, and optimize it through iterations.

## 1.1 Context

Company X is one of the largest plastic additives suppliers and has the power of being a front runner in adopting new technologies in trends such as recycling. The business requires a global integration of marketing strategies for this trend. As an intern for the digitalization team in marketing, the author’s role was to assist the current project, the plastics additives for mechanical recycling. The author is also a native Portuguese speaker and provided support conducting interviews in South America to understand customer needs and develop a customer journey for this area.

The department focuses on adopting digitalization as an enabler of process effectiveness and a driver of new business, creating accessible and fast action in its platforms. Furthermore, due to the recycling trend, the plastic industry faces a change in the value chain, and the business wants to identify it. Initially, the plastic additive industry is presented and its chemical complexity is conveyed. Then the improvement of the mechanical recycling market is explored when correctly addressing the value chain.

### 1.1.1 Company X

Company X has a structure well defined through the business segment, especially for its size and broad competencies. The sections are grouped into Chemicals, Materials, Surface Technologies, Nutrition & Care, Industrial Solutions, and Agricultural Solutions. This market-specific segmentation gives the divisions operational responsibility and capability to attend to the respective value chain.

According to industry trends, it is a chemical company with ambitious goals towards sustainability. For the Plastic Additives segment (PA), improve the industries' value chain, provide solutions towards circularity, clean energy, and have neutral carbon emission on its production. Goals also target other industries downstream, and incorporate recycling content, borders this project, making this project more flexible and dynamic, improving circularity and increasing production.

The author of this paper is part of the Digital Excellence team supporting the Plastic Additive business segment. The segment develops and markets additives for industrial applications, including antioxidants, light stabilizers, pigments, and polymer dispersions. Those solutions can be applied to several industries such as plastics, transportation, or energy.

### 1.1.2 Plastic Additive Industry

Plastic production has increased over the last few years, primarily due to its inexpensive, durable, and lightweight nature (RHEIN; STRÄTER, 2021). Forecasts show that industrial and personal use will grow until 2050, but processing might transform due to the circular economy (PIMENTEL PINCELLI et al., 2021). Various chemical substances, known as "additives", are presented in the composition when addressing plastic. The additive objective is used to prolong the plastic life and enhance polymer propriety. The negative side of additives is the potential of contamination they have to things such as soil, air, water, and food – this last one has packaging processes accountable to such contamination (HAHLADAKIS et al., 2018). The plastic can be returned to the value chain through the mechanical recycling process, which focuses on a circular economy approach.

When a new PA comes to the market, the question must ask what problem it solves. Additionally, companies inquire if the new PA makes the process more efficient, the plastic lighter or affects the illumination absorption. The study in perspective, questions if it makes the recycling process with fewer unwanted sub-products and improves mechanical quality and process efficiency. The ways an additive can disturb this process include:

- Possible contamination of the plastics polymer in early stages
- Polymer mixture damaging the sorting and recycling process
- Chemicals sub-products that might damage the quality of the recycled material
- Black carbon emissions

On the positive side, plastic packaging protects food and goods from contamination, it is light weight, and the low density excludes other heavy materials from utilization. Plastic can also be applied to medical areas and safety equipment (HAHLADAKIS et al., 2018). In addition, the additive provided contributes to the mechanical and thermic performance of the complete material.

It is most relevant to approach the plastic market as an integer and measure the impact that a plastic additive company can have over this market if they change their approach towards a sustainable strategy such as mechanical recycling solutions. This will help understand how the rest of the chain will position themselves towards acceptance or resistance in recycling adoption and using additives as part of a solution.

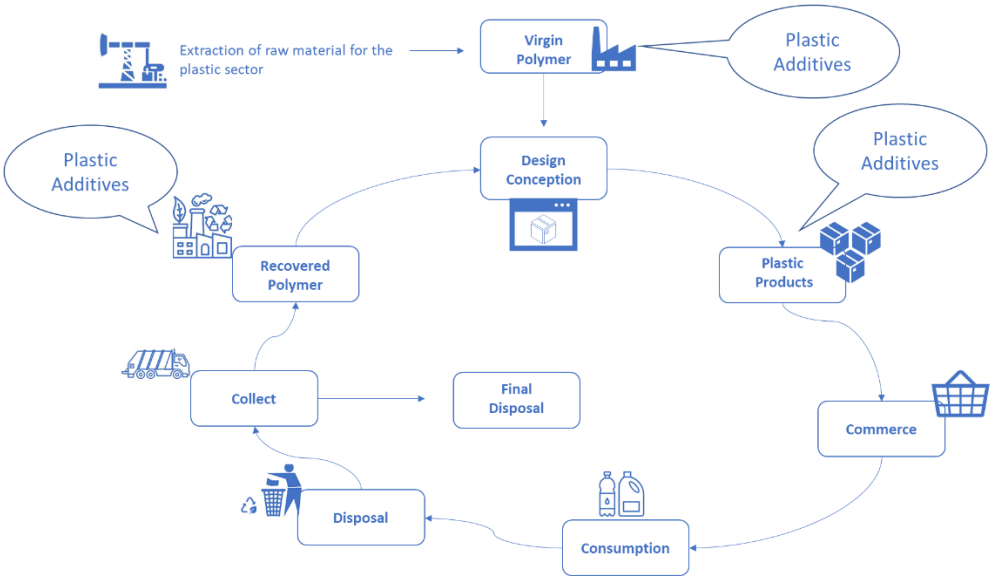
### 1.1.3 Mechanical Recycling Market

Due to federal regulations, increasing technology, and incentives, recycling is a global market trend, alongside consumer awareness and sustainability strategy. These are becoming core values for multinational companies (RHEIN; STRÄTER, 2021). The chemical industry tries to innovate its plastic additives' composition to make this process efficient and sustainable, transforming the recycling process since the beginning of the journey.

An industry connection must be made when shifting from a linear state of production to a circular life cycle. Figure 1 traces the main steps towards achieving recycling and where Plastic Additives

participate. The additive participation in the recovered polymer can improve reprocessing steps and becomes essential for the circular economy. The virgin polymer needs additives according to the buying industry; “plastic products” refers to a processing step (in this work referred to as “converters”); the recycled polymer relies upon reconstituting mechanical proprieties. As seen further, the market depends on the complexities of collection and disposal, the bottom neck of this system.

Figure 1. Plastic circular life cycle




Source: Adapted from Abiplast Perfil 2019

Most recycling operations start small, but the industry is becoming consolidated due to mergers and acquisitions made by polymer suppliers, as seen with Suez and Lyondellbasel's example (CHANG, 2021). The European Union (EU) leads waste management and recycling globally, due to its well-established infrastructure in waste collection and systems. Organizations such as PlasticsEurope Market Research Group (PEMRG) track the European development annually and compare it with worldwide production.

Low mechanical recycled material rates are assimilated into difficulties separating the polymer into homogeneous streams, considering poor infrastructure in collecting and sorting. The EU, adopted this infrastructure years ago, but in South American countries, the logic is pursued through municipal and organizational initiatives (PIMENTEL PINCELLI et al., 2021).

The complexity of this industry lies in a varied supply stream and value chain (LA MANTIA, 2002). The material's price is linked to the virgin material; therefore, the process's demand and financial viability fluctuate accordingly to the virgin resin (internal knowledge). Only regulations are strong enough to hold oil prices or incentives for recycled material can make the Recycling Industry jump ahead in investments and gain power in the plastic value chain.

### 1.2 Motivation

The changes the market faces through recycling growth and business circular economy transformation are the primary motivations for this work. However, there is a lack of communication and knowledge sharing between partners concerning which technology can support them for this purpose. Companies with recycling knowledge can use the advantage and gain space in the market. Digitalization act as an enabler, helping to overcome the lack abovementioned.

It is crucial to understand how these markets change towards sustainable production and recyclable plastic material, as well as pursue opportunities to innovate portfolios at a competitive speed. Pimentel Pincelli et al. (2021) presented results over waste management and information systems to raise the awareness of this sector to develop a circular economy. “The reduction of cost and impact that can be achieved in the value chain by eliminating sourcing of raw materials and waste processing allows business and society to redesign and invest in a circular system” (VAN BUREN et al., 2016). The link between material sourcing and waste stream for recycling is the opportunity for plastic additives.

How those markets do business and how this company can address them are the questions this paper tries to answer. With mechanical recycling as a future goal, it is still unclear how each industry segment will engage in its own space. Moreover, each future perspective encountered

during this research will enlighten the reader and the company on the best approaches to pursue and how digital marketing impacts precise customer engagement.

### 1.2.1 Digital Marketing at a chemical industry

Traditional marketing concepts can help redesign processes. On a business-to-business model, the importance is to sustain a good relationship with partners, encourage innovation, collaboration, and measure their impact over one another through digital marketing tools (PEDERSEN; ELLEGAARD; KRAGH, 2020). The traditional chemical industry brings performance and operational action focused on the bottom line of production: running efficient operations, optimizing prices, and product management.

Digitalization has the ability to make action faster and simpler. It also helps create effective business units (GERASIMENKO, 2021). However, digitalization goes beyond the company's core business: customer relationship management, market trend opportunities, and data analysis are intelligent moves in which business performance could attach.

Marketing has the potential of transforming internally and externally how the industry must do business. Its core function is to study the market, anticipate and provide solutions for the client's needs, and educate its internal staff on promoting growth. The problem approached in this section is the impact digital marketing had on its management and how it drastically changed chemical companies' marketing. The skepticism those enterprises have towards digital transformation is expected due to barriers in organization flexibility and agility (GERASIMENKO, 2021).

Each client of the PA business unit has a unique problem that only a technical visit promoted by Company X can solve. A client-based understanding alongside personalization of this client's issues can direct this customer to the right product without needing a product chase. With the portfolio, personalization can work together with digital tools to improve customer search, purchase experience and master technical solutions to current clients and prospective industries.

## 1.3 Objective

The project aims to automate digital marketing for the PA segment related to mechanical recycling in packaging and consumer goods. Additionally, the project aims to improve the additive market comprehension for this company's positioning, to understand the product and customer cycle, and to establish stable and trustworthy communication between stakeholders through digital transformation. Therefore, one must acquire knowledge was acquired by approaching this organization, internally and externally, making previous and new customers feel like part of a sustainable value chain. For that, interviews with different key stakeholders were conducted to understand the value digital transformation will generate. This can open opportunities to develop new marketing strategies.

After determining the plastic value chain's direction towards recycling, the author aims to identify, analyze, and construct a digital marketing concept that could help B2B communication and promote a positive impact on how those segments do business. Considering that literature on this topic is still scarce (LILIEN, 2016), this work was conducted in one of the most traditional markets as a case study and describes how an incremental transition to digital marketing can be created.

Digital marketing concepts are presented to engage  specific personas. It is assumed that with the right marketing strategy, circular economy will grow with the right participants. After a description of the customer journey and bringing relevant market data, this project will focus on a strategy expanding the window of opportunities for new markets and enhance the current company structure.

## 1.4 Justification

This graduation conclusion work is inserted in a global project for the PA department. This department revently had its management restructured to attend all business regions at the same marketing maturity level, which implied all markets' comprehension and achievements towards mechanical recycling processes.

Internal data analysis and region divisions clarified differences beyond cultural and organizational structure. This work compares two markets, the European and the Brazilian, describes their strengths and pain points, and defines new marketing strategies.

It is asked from the digitalization’s head that this work is delivered to document accomplishments, learnings, and prospections. Initial market research is planned with internal and organizational data, internal stakeholders' interviews, and customer pain points analysis to design PA's customer journey. Digitalization in marketing will guide the prospected customer through this journey until the sale is complete.

There is a lack of marketing research in B2B segments from an academic perspective compared to Business to Consumer (B2C) (MORA CORTEZ; JOHNSTON, 2018) and less academic competition (LILIEN, 2016). This work contributes to the educational field by detailing how digital marketing in B2B is planned, designed, and implemented. Moreover, it fits in the window of opportunity for B2B research proposed by Lilien (2016) to improve marketing sophistication and the global nature of B2B markets, which this paper will widely explore.

### 1.5 Structure

This work is structured in 5 chapters. The first one, the **Introduction**, presents the work and project context, a motivation that leads to the proposed thesis research, and goals to be achieved. The relevant company and the recycling market are also presented to provide the reader insights into how it is structured, how processes are managed, and how it pursues new business development in the segment the in which the writer is working.

Chapter 2, **Literature Review**, presents theories supporting this research and contains the pillars for the study. It is divided into Marketing strategies inside B2B concepts, Strategy Analysis for the segment impacted by the project, and digitalization to develop the automation marketing strategy and its following management. In sequence, chapter 3 registers the **Methodology** approached through data collection procedures to construct a valuable customer journey.

Chapter 4, **Analysis and Results**, incorporates previous perspectives on the plastic value chain, internal and external analysis, interview outcomes and discussions. Chapter 5, **Digital Strategy**, discusses how the insights from chapter 4 can promote an efficient digital strategy. Finally, results from the presented journey will be delivered in chapter 6, **Conclusion**.

# 2 LITERATURE REVIEW

The literature is fundamental to guide the readers through the existing research basis. According to articles and within traditional business perspectives, a literature review has been conducted to place the existing framework of Marketing B2B and the digitalization roles towards it. Definitions and concepts extracted were aligned with the constant environmental changes that digitalization brings.

Academic literature provided by renowned journals such as Industrial Marketing Management and Harvard Business Review gathered consistent and valuable information over marketing B2B and its development towards innovation's dynamics. The search included Journal of Business-to-Business Marketing, Journal of Marketing, and Journal of Business Research to enrich marketing management studies. In addition, keywords inserted in Google Scholar, Springer Link, and ScienceDirect brought together academic knowledge, especially regarding digitalization, data science, personalization, customer journey, marketing automation, and how these items can develop the industry marketing.

## 2.1 B2B Marketing

Marketing is the art of reaching customers at moments that influence their buying decisions. It is the market teacher and involves excellent comprehension of both, supplier and consumer. From the B2B perspective, the supplier business must be aware of its competence, technology, and capacity to attend to the desired target. On the other hand, the consumer is not obliged to know what he needs but can and will determine how they want to be approached by others.

Increasing competition through global trade makes the industry revise its marketing routines. A misalignment of marketing and sales activities, cultural differences, unclear objectives can affect the quality of customer experiences or jeopardize relationships. The business-to-business market differentiates from B2C precisely in that they can establish a relationship with the client and the market response over any change is almost immediate. A B2B company tries to solve its business customers' problems, and chooses where in the value chain such company can make a meaningful contribution (SCHWAGER; MEYER, 2017).

The rule of understanding the customer remains the same for both models to provide an effective marketing campaign. Knowledge of where, what, how, and why the customer buys is still influential in directing the organization's resources and defining strategy. The challenge of understanding this practice in B2B marketing lies in the market fragmentation, inconsistency, and lack of precision (PEDERSEN; ELLEGAARD; KRAGH, 2020).

A market study should be the first step into a consistent marketing plan. Indeed, the global market dynamics continue to change faster, especially with digitalization advancements, but its marketing structure must be aware that this study might repeat itself internally. The key to success lies in providing this analysis faster and in the design to act likewise. Marketing must provide the knowledge from current and future customers, which is critical to innovation projects' success (LILIEN, 2016). Including marketing in the innovation process can alleviate time-to-market pressures and improve the project outcome.

After the market analysis, segmentation is an efficient tool to guide the company over which business they should target according to traits deemed to be internally convenient. Further mentioned literature brings reasons to segment and different variables that a business can utilize to do so. How the company will decide to detail is entirely up to its strategy and marketing direction. Nevertheless, if those two characteristics are aligned, the precision lack of marketing practices quoted by Pedersen et al. will be out of the equation.

### 2.1.1 Market Segmentation

According to Mitchell & Wilson (1998), segmentation is the "process of dividing a potential market into distinct subsets of customers and selecting one or more segments as a target market to be reached with a distinct market mix". It helps firms adopt a position in the market by allowing the identification of demand-based segments and customer heterogeneity. Therefore, the marketing concept's essence has ground in identifying the client's needs. Lack of consideration for those needs should be a prime segmentation variable. How broad or narrow the definition of requirements will

be, is a decision with significant consequences for any analysis. This one can provide the firm's optimal resource allocation and marketing strategies. Besides, correct segmentation enlightens how indirect customers can influence the downstream value-chain and the market's behavior. Finally, Mitchell & Wilson (1998, p.431) define segmentation for B2B as:

> "an ongoing and iterative process of examining and grouping potential, and actual buyers with similar product needs into subgroups that can then be targeted with an appropriate marketing mix in such a way as to facilitate the objectives of both parties. The process has strategic and tactical marketing implications and should be periodically reviewed to incorporate the lessons of experience and to maintain an optimal cost/benefit ratio."

Two interesting variables suggested by the Mitchell & Wilson (1998, p.433) are the purchasing structure and type of purchase in organizations. Since this thesis's target is a PA portfolio, the combination of additives solutions is well defined according to each customer type and technical suggestion. The only implication the article targets for this segmentation's structure is a need for a regionalized sales force for a centralized purchase, plausible for a multinational company with strategic subsidiaries. Consequently, each segment's purchase type will have similar characteristics facilitating the marketing objectives to be achieved.

The secondary variable in the segmentation is exemplified with Shell Lubricants UK, whose approach is based on the buyers' characteristics, analyzed later as 'persona'. The literature collected by Mitchell & Wilson (1998) suggested that any factor that influences how the organization purchases can be used as a segmentation variable. The examples are organizational culture, degree of internationalization, past, present, future profitability, and even ownership structure. They understood the decision-makers' behavior patterns inside the organization and treated them as a target group. With this knowledge, approach the right person inside the organization in accordance with ownership structure has value to Company X.

There is a gap between perceptions in the technology sector: the customer's needs and the benefit of the supplier's product. An innovative approach to identify and communicate those needs would end this gap through a collaborative channel. It is essential to recognize the learning process of segmentation, starting with the familiar – both supplier and customer need to work collaboratively towards a better mutual understanding. Nevertheless, any approach chosen is arbitrary and usually

based on managerial judgment and intuition. The highlight cost factor for segmentation comes from the number of segmented methods used, which incurs analyzing data for each method and managing time to interpret it. The more ways it is segmented, the more costly it becomes. Complete segmentation over customer needs is required in highly competitive markets only. (MICHELL; WILSON,1998). For Company X's case, a segmentation over customer region, type of purchase, product are valuable enough.

In this context, digitalization comes as a solution for data analysis and machine learning for micro-segmentation types. This stream considers web design, e-commerce, and social media. There is no evidence to support that B2B firms focus on micro-segmentation, and insight is needed to help how they practice and create variables. Since the business market is situational and complex, each activity search for its internal characteristics to adapt the business methods to this market is unique (MITCHELL; WILSON, 1998). When the organization pursues one persona inside another business, the micro-segmentation can be elaborated, and this work will provide how this segmentation is done.

The opportunity of using customers' intentions towards collaborative work is presented as a segmentation base. The combined work should be seen as more than analyzing the environment or resource allocation (FREYTAG; CLARKE, 2001). When part of the market, it engages the company's internal work and shapes the environment itself. This study reflects the situation where a company is in a "simple market transaction" position and wants to move towards a "complex relationship management". The first is just supplying accordingly with demand and the second assumes there is a "relationship" included. Complex relationship management carries the capability to adapt to individual customers and enter specific developments, bringing a co-creation value point. Since the supplier's perspective dominates the literature, a balance of needs is necessary to make segmentation helpful in the supplier-customer spectrum.

Competitive analysis for segmentation purposes must be done in respect to:

a) The entry of new rivals
b) The launch of new products or service
c) Shifts in technology
d) Effect of changes in government regulations and protection.

Therefore, competitive analysis is made for market monitoring in most cases. Successful stories involve key customers in technology development. When there are perceived or anticipated competitive pressures, the marketing strategy uses segmentation to increase sales, customer retention, and satisfaction.

### 2.1.2 Personalization

Personalization customizes and delivers content and services accordingly to the customer's experiences. This study sphere tracks how digitalization can identify each customer based on past interactions, providing the best product fit. Behind the company's automation capacity, information content at online platforms can display differently to each segment of customers, have transaction flexibility, and be personalized per contact. In this context, the biggest challenge for a B2B company is the difficulty in personalizing to whom they are addressing the other business client.

The market analysis comes back into the discussion to clarify any possible changes in the supply-customer relationship to generate personalized content for a business segment, and in this form, address the business challenge. How a person does business and how they look for their solutions must be clear to manage the search engine's variables to work alongside the correct parameters and collect data. The person’s searches can help identify their path through communication channels and lead to the creation of a specific customer journey, for example, a journey for those who have particular knowledge about the company and a journey for those who do not.

A picture provided by Edelman & Marc (2015), as an example, is from a solar panel company, Sungevity, that successfully engaged the customer by inserting themselves into the client's storyline. Sungevity showed the prospective customer nearby who acquired their product – with previous consent -, how their clients were saving energy and how much their house – based on their information willingly provided – could save costs (actual numbers). After desire was triggered

through informative and exemplified content, the website was ready to complete the purchase according to that specific profile when the customer had the buying action intention.

It is valuable to know whom the industry compares when bringing this perspective to a B2B model. An additive solutions company can intermediate knowledge by looking at the plastic value chain and from whom resin producers and masterbatches want information. A process example for achievement is:

a) Provide content about which product matches with which industry to achieve desire;
b) immerse themselves into associations and be the actor of knowledge propagation to increase awareness;
c) open access to the engaged customer to receive technical support and creation;
d) sales team, at the end of the journey, ready and steady to promote an offer.

Personalized marketing aims to decrease customers' search efforts, which can subsequently increase customer loyalty. The feeling of controling and creating experience affects the usability of the platform and the engagement acquired. Therefore, personalization is not about taking out the client's effort in search and purchase but instead providing the right content in the right place at the right time to the right person.

### 2.1.3 Persona development

A persona is a fictional representation of a person or target group with an interest in an organization. Going beyond clients, a persona for a digital journey represents anyone with the intention of search through the company's channels. Nowadays, regulators, students, competitors, the general public are also navigating through companies' channels they are interested in, and they can be represented through a persona. "False preconceptions about users can result in poor design, product development, and marketing decisions, so rectifying these preconceptions is essential for organizations." (SALMINEN et al., 2021). It can therefore help the company achieve sustainable growth.

Digital or otherwise, a persona is in-depth, comprehensive characteristics and attributes. It is a method that brings a customer to focus on business objectives. It is about understanding a customer and their perspective on enhancing their company's goals and careers (ALBEE, 2015). Albee's (2015 p. 47) work brings along three unique personas a company possesses: a buyer persona, customer persona, and user persona. Buyer personas are looking to solve a problem, including a product or service, and are usually in decision-making roles. A customer persona is after the purchasing step, and the objective is to keep them, meaning, increase loyalty and retention. Finally, user personas have continued use of the product and must be maintained through new additions, extensions, and upgrades.

Customer journeys should be created based on a persona, based on the responsibility of their role, and aligned with what the company sells (ALBEE, 2015). To construct a persona, after a research and interviews phases, Albee (2015 p. 49) suggests the following structure:

- A first-person scenario reflects the situational complexity and how that persona tries to solve the problem. Also, include references to other personas and how they interact;
- Objectives, obstacles, and orientation, which includes their goals, primary challenges to achieve them, and the persona's background – graduation is given as an example.
- Identify the problems that are keeping the persona from achieving its objectives. For example, if the offer is not relevant or takes a long path to find it, it disengages the customer.
- This persona's questions are defined based on the buying process stages and the three steps mentioned above. Here is to determine the questions it must be answered for this client to keep doing business with the company.
- Identify keywords and phrases they will use to find information about their needs. Relevance and context have the same appeal as search engine optimization (SEO).
- Social Media and Online destinations to discover where they are mostly online. Commonly used websites, webinar attendance, blogs, and which industries newsletter they subscribe to are examples of tracking activities. Each persona inside the organization responds differently, according to their role and position.

- Engagement scenarios attack each persona differently from the channel perspective. Where to publish the content for a determined persona is a question it should be answered.

This development is made by two processes: interviews and external research (ALBEE, 2015). Internal discussions can gather firsthand information about the customers, and afterward, interview customers with the support of a questionnaire that combines answers to the items above. Albee's (2015) work contributes to persona development and determines its value: creating a digital strategy and a storyline for message consistency.

### 2.1.4 Customer Journey

"A customer journey is a series of steps a customer goes through during a touchpoint with a company" (SALESFORCE, 2021). It involves the awareness phase through the marketing funnel's purchasing process, the still used attention-interest-desire-action (AIDA) model. The journey's construction objective is to reach consumers at the moments that most influence their decision. Those moments, called "touchpoints", are crucial: they are part of a sophisticated approach to help marketers navigate this nonlinear environment in the digital era. This approach places customers at the center of the marketing strategy (customer-centricity) by enhancing those crucial moments and customer experience.

Customer experience is widely explored by literature, but this work will focus on how it is constructed, following Tueanrat et al. (2021). Such construction should focus on customer engagement first, observing how the customer reaches out to the company (touchpoints), and initiate contact. A touchpoint can include, for example: reading an email, making a purchase, talking to a service (or sales) agent, and downloading brochures.

The second development in construcing personal experience focuses on measurements of experience by customer satisfaction and service quality. Good outcomes from both steps increase commitment – measurable with analytics, for example – and trust. It is significant to highlight that trust already established between partners does not influence a customer experience, "but a good

experience might, however, build trust" (TUEANRAT; PAPAGIANNIDIS; ALAMANOS, 2021), a fact of extreme importance in B2B relationships for collaborative work and innovation.

According to the managerial-oriented customer experience literature, four key capabilities are required to develop successful customer journeys: automation, personalization, contextual interaction, and journey innovation. In the digital age, managing the customer journey is crucial before completing a sale (EDELMAN; SINGER, 2015). All four capabilities will be explored through the paper: guide the customer through their online path, build personalized content, engage them through every purchase step with automated content, and add improvements to guarantee customer experience and loyalty. In addition, manifestations during customer engagement are possible touchpoints along the journey and should be paid attention to when delivering a service.

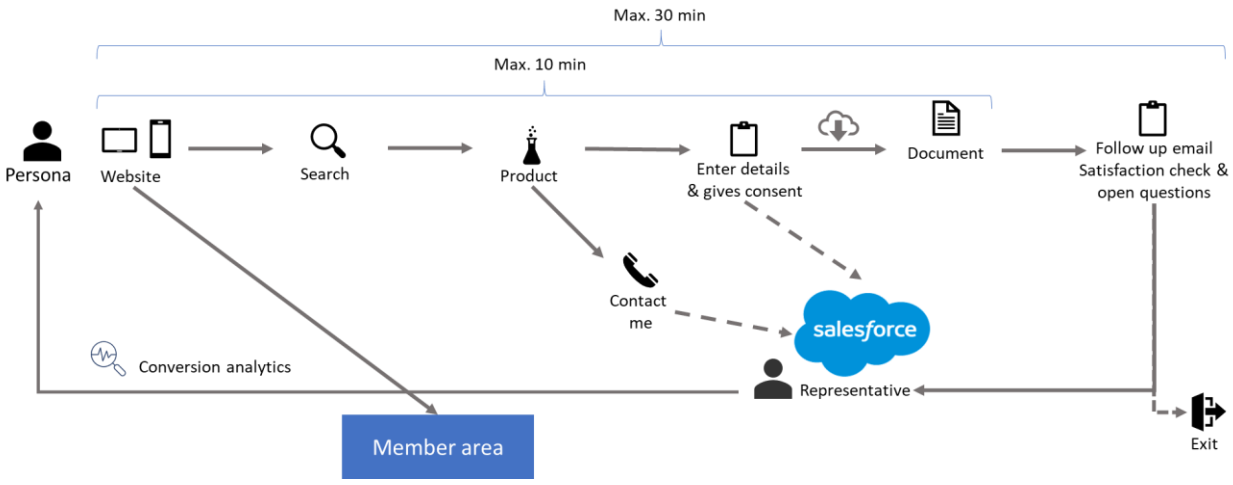
With the proper automation process, it is possible to identify the customer's virtual position in the journey – reading a product content or other customers' reviews as an example (SCHWAGER; MEYER, 2017) in which decision making over which service to provide happens. From this position, possibilities over guidance and engagement through automated mail, download content over a product or service, surveys to better comprehend who the customer is, and improvements of each of these manifestations complete the capabilities promoted by Edelman & Singer (2015). This is the reason why a good persona definition and segmentation are made previous to the journey design.

Innovation at the journey comes with experimentation and implementation of features that aggregate value to the customer. Starwood's company is an example of journey innovation by adding features to their hotel management app: they started with mobile check-in, coordinated room number and key, and later, integrated room service including previous purchases and local suggestions nearby for tourists. This example's primary value concerns their customer touchpoints and improves their usability by shortening the gap between customer expectations and experience. Bringing this example to a B2B scenario, business must map what the customer wants to see or do next in the journey to improve such usability values. For that, map the businesses' interactions, link with whom they look for solutions in the value chain, promote better experience and engage them at the right time.

Both business segments, B2C and B2B, must have a clear picture of the journey's anatomy to associate touchpoints where value can be created through new features. The whole journey value is affected positively when the correct service is provided at the right time. The biggest challenge to a B2B is that it may involve dozens of individuals in the buying process, making this trace complex (LILIEN, 2016). Despite this, it does not take customer experience in Business-to-Business organizations out of perspective. Instead, it becomes a relationship between structures within organizations with a set of issues and priorities. An advantage for a good customer journey creation in B2B is segmentation by industry and personas' development to identify the person's search characteristics.

Well-designed journeys allow creating paths as "decision trees", meaning executing specified tasks according to customer choice. Definition of a persona and a good segmentation strategy are the basis for design, content personalization, and contextualized campaigns. The first step is to identify one short journey where the enterprise could quickly win and implement from there. As an internal example, the journey provided in Figure 2 is of a possible client who is aware of the brand. The path towards a product could have the following structure:

Figure 2: Model of a possible customer journey for PA




Source: elaborated by the author with internal content

The structure exemplified in Figure 2 is one plausible interaction between a customer with particular knowledge about the company, the website, and its products. Assuming this persona goes to the website, searches for one specific product and reads some information over this topic, the persona can either try to enter in contact or download available materials. Since this industry requires specific validation for sharing materials, the upper ramification of the journey will consider the persona's data before allowing the download. This is one of the opportunities for surveys and nurtures the generated lead. On the other possible path, the persona is looking for a faster contact and they probably desire to buy, which requires a direct connection with sales representatives.

Since the digital environment requires agility in delivering the persona's content, the entire journey should quick provide the answers he look for. This path validates what content should be created and available in the digital platforms to optimize the company's workflow. One possible feature is the Member Area, specifically for current customers, giving people possibility of entering at the very beginning of the journey.

A few tools such as Marketing Cloud Salesforce are used to map this journey. When cloud pages are created and incorporated with connections between Google Ads and email marketing, it is possible to document every interaction within the journey. This is where monitoring and analytics gain space, measuring clicks, bounce rates, average time spent per page and conversions. The data increases the knowledge over the persona and helps identify "Moments of Truth" that happen even before the customer inserts a product in the cart.

A journey can be created for each path of interactions the customer has throughout all channels. They monitor using aforementioned data, which helps with the innovation process for customer satisfaction (TUEANRAT; PAPAGIANNIDIS; ALAMANOS, 2021). Focus on the client relationship evolution associated with the journey implementation is one of the future researches that Tueanrat et al. (2021) suggests in the literature review and is pursued in this study. Channels for after-sales activities are a suggestion for future work as well.

## 2.2 Strategy Analysis

Two tools can complementarily provide a complete picture of the environment and interpret the company's market position; the commonly used PEST and SWOT methods. "The success of a company depends not only on the market attractiveness but also the company's strengths and weaknesses against those of its competitors." (AGHAZADEH, 2016).

First, a PEST method is generally applied to examine trends in the macroenvironment, the actor's forces that might be identified between opportunities and threats to the company (AGHAZADEH, 2016). Second, a SWOT analysis supports an internal examination of the business to interact with the specified external scenario (CARVALHO; LAURINDO, 2006).

### 2.2.1 PEST analysis

This model supports the business in determining its strategy in the respective market. By analyzing the macroenvironment on a broad scope, its task is to "identify significant factors of the remote business environment" that may impact its performance (AGHAZADEH, 2016). Four categories of the external environment are included in this analysis: Political (P), Economic (E), Social (S), and Technological factors (T).

Political factors influence regulations, law, business requirements, and incentives (AGHAZADEH, 2016). It requests to examine carefully what regulations and legislations are in place and affect the business environment. The examples given by Aghazadeh (2016, p. 260) include patents, intellectual propriety protection, and even corruption levels of the current government. Tax and governmental infrastructure are key challenges from the waste management perspective and must be considered when analyzing political factors.

Economic factors impact supply and demand for products, services, organization's costs, and distribution. Therefore, discovering the level of government intervention, investment, and spending in the sector analyzed are interesting self-assessment questions among others proposed by

Aghazadeh (2016, p. 260). Economic growth, unemployment, inflation, and interest rates are investment factors in the decision-making process of conducting business in determined countries.

The Social (S) element comprises demographics, education, health and safety, wealth distribution, and more (AGHAZADEH, 2016). It is necessary to understand how those elements impact the business and how business will be conducted accordingly. Regarding recycling, an essential discussion includes attitudes and social behavior towards waste disposal. The problem is deeply dependent on education, environmental consciousness, and health assessment.

Finally, the Technological (T) factors aim to utilize and comprehend the advancements in this field to open opportunities for innovations (AGHAZADEH, 2016). One of the self-assessment questions proposed by the mentioned work brings the impact of technological developments in the value chain, which this research answers. The answers categorize how disruptive and diffuse the technology is among players and evaluate changes in the value chain structure.

### 2.2.2 SWOT analysis

The SWOT analysis (Strength, Weakness, Opportunities, and Threats) is used to determine an organization's limits, maximize its strengths and develop opportunities in the competitive environment (CARVALHO; LAURINDO, 2006). In the mechanical recycling context, it is important to verify and compare the characteristics of the SWOT to implement the strategy created.

There are several items analyzed at the “Strength” level, such as factors that differentiate the company from its rivals, including product differentiation, bargaining power, market entry, and mobility level in the market. A company that requires a lengthy decision-making process, for example, loses at this level if its competitors can implement strategy faster. On the other hand, if the company has the resources to overcome its mobility issues, construct and adapt its barriers, and involve other strategic players, its strength increases (CARVALHO; LAURINDO, 2006).

Factors that harm the mobility barriers described would increase the organization's “Weakness”—the exact opposite of what gives it strength. Hence, when the company is exposed to the competition environment, its bargaining power is weak and small compared to its strategic group,

the company has low strategy implementation capability. This is considered a weakness that exposes the organization (CARVALHO; LAURINDO, 2006).

Although the PA market is highly competitive, this analysis's "Opportunity" level shows the possibility of equivalence. Carvalho (2006, p.53) states that creating a new strategic group or changing a favorable position in an already existing group increases opportunities. A swift in the company's position and the straightening of relationships in the strategic group are also mentioned (CARVALHO; LAURINDO, 2006).

Finally, the "Threat" section is composed of factors that limit the company's mobility in the strategic group. For example, if other companies join the market, they can cause a reshape in the bargaining power, which can worsen the product availability relation (CARVALHO; LAURINDO, 2006).

### 2.3 Digitalization

This section will approach two main concepts required for the project: digitalization in marketing and marketing automation. First and foremost, digitalization presents the advantages a chemical company could have by enforcing its digital structure. Present studies strategically assigning efforts over branding, communication content, where the customers search for information, and how to engage these customers. Second, marketing automation is an implementation goal to the business strategy, providing quick response and acquiring leads, uniting sales and marketing efforts.

The transfer of workflow, customer management, product search, and purchase to digital platforms is still a work in progress for B2B product-oriented companies. The traditional face-to-face relationship is being replaced with online communication platforms, manual marketing work is being replaced with with IT automation tools, and customer prospection is moving quickly towards social media. According to Lilien (2016), "Business as usual is not sustainable anymore", and two of the driving forces contributing to it are the advances of digital information technologies (IT) and the potential of B2B big data and analytics (LILIEN, 2016). As business continues to use more

digital channels, people will give particular importance to how the Marketing Mix adapts to this sphere and how marketing automation tools are utilized to increase benefits from digital services.

Digital services and IT are indisputably relevant in modern business, however it they are unlikely to replace personal interaction in every single situation. Lindh & Norman (2018) try to answer how IT affects business relationshps alongside customer-interaction processes. They focus on B2B service-oriented firms and state that IT integration should not be seen as increasing or decreasing other forms of interaction, it is a synergy between personal interaction and technology. When customers look for products through digital platforms, they need assistance since their solutions are particular to each case – exceptions must be included in the additive context. In this matter, it is inevitable to have human interaction at some point in their digital journey. These findings mirror those of product-oriented companies.

### 2.3.1 Digitalization in Marketing

Organizations are aware that the enhancement of the flow of information and trust among customers are benefits of digital marketing. The availability of information on various products and services helps organizations make precise decisions about their customers and manage them through all communication channels. However, due to a lack of comprehensive knowledge about B2B digital marketing practices, this technique is less utilized in this market (LILIEN, 2016).

Within digital marketing communication studies, four categories are named to establish a good relationship with customers: branding, advertising, content marketing, and interactivity. Branding influences the company's perception among other players, providing loyalty, high sales, and market presence; the content available should be providing relevant material for advertising and social media platforms to generate the appropriate interactivity with customers. B2B content marketing aims to engage customers through creation, distribution, and sharing relevant content at the right time, maintaining a healthy long-term relationship among partners (VÁZQUEZ et al., 2014) (LILIEN, 2016).

The explosion of different customer touchpoints, which come from multiple channels such as social media, plus the difficulty to control and manage customer experience made companies shift their

strategy to integrate various business functions through IT tools. These platforms can now incorporate marketing, sales, operations, and technical partners, creating and delivering a positive experience.

Companies can measure their digital marketing performance in two ways: Web analytics and social media monitoring. According to Järvinen & Taiminen (2016), the benefits of using these tools for strategic decision-making by B2B companies are unclear. The uncertainty of utilizing those tools is an argument as to why the recognition of benefit is vague. Training and synergy of personal interactions are necessary to enable the team to find the best parameters and optimize how they use both tools.

Marketing - digital or not - carries the importance of consistency in the storyline. "How you tell your story to a prospect through all of your customer touchpoints could be the difference between winning and losing a sale" (KELLY; JOHNSTON; DANHEISER, 2017). Digital marketing offers a broad range of communication channels that must carry the same message and the message must get the right persona at the right time.

Digital Marketing also raises the discussion over the power of content marketing and its importance to contain what the customers need— another reason to research the market and uncover the customer's values. Before the internet, salespeople in B2B organizations controlled the information through in-person or phone relationships (KELLY; JOHNSTON; DANHEISER, 2017). With the advantage of the World Wide Web, the number of possible ways to reach the customer increased. That being said, the quality of the interaction did not increase necessarily.

One reason to develop research, client interviews and personas is to create a value proposition through digital media. The processes described in sections 2.1.4 and 2.1.5 of this paper will guide development to achieve the best returns in marketing and sales applications. A stronger message will create a deeper connection. Personalized content is an extra method that a few marketing

automation tools allow in order to segment and tailor the message. Personalization is also discussed in section 2.1.3.

### 2.3.2 Marketing Automation

Companies recently started building automation platforms designed to enhance customer engagement. This automation involves a software platform that unites sales processes with content marketing processes, responsible for creating, distributing, and sharing relevant and timely content to customers (JÄRVINEN; TAIMINEN, 2016). In addition, it can deliver appropriate content based on specified customers, bringing attention to the platform's personalization power.

Such personalization is a recurrent term for this work and the work of Järvinen & Taiminen (2016). The term “personalization” refers to the customization of marketing mix elements at an individual level. The way in which an organization will learn about their customers and track their behavior patterns is a legal and challenging task for every region (internal knowledge). This challenge can only be overcome with the capabilities IT automation tools offer towards marketing.

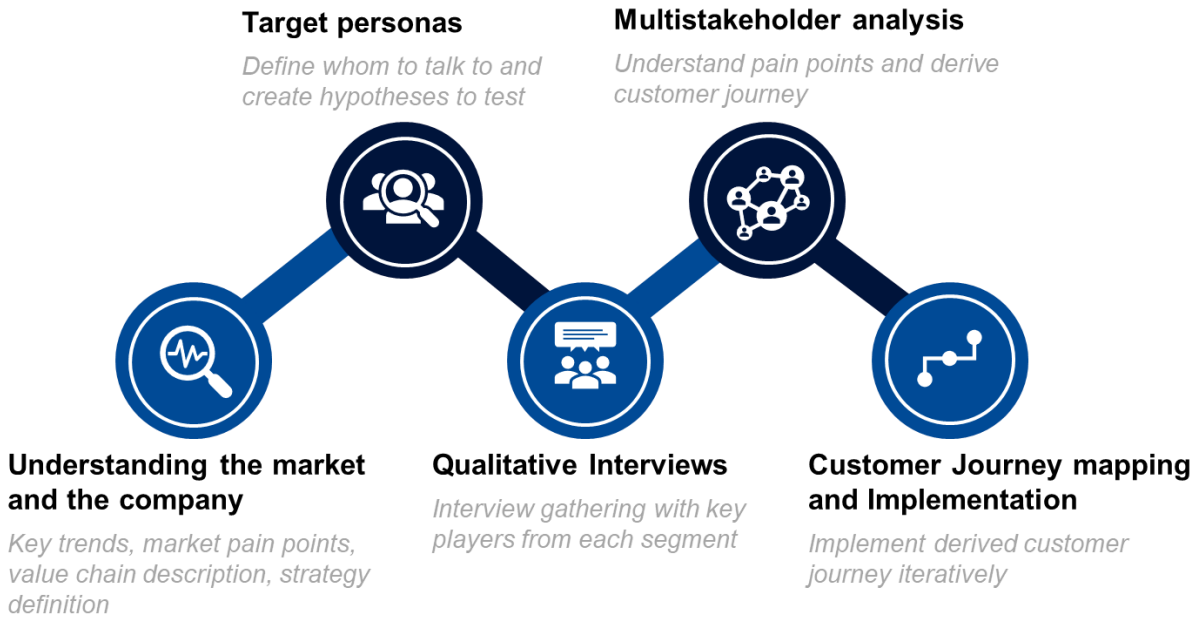
Marketing automation can exploit passive and active ways of learning about the potential buyer (JÄRVINEN; TAIMINEN, 2016). “Active ways’ involve asking questions and interacting with the customers. Examples of active approaches include linking customers to websites for surveys, asking if they would like to be contacted by a sales representative, or asking if they are interested in the company's newsletter. “Passive” methods refer to tracking customers’ clickstream data.

The business objective of marketing content should be a storytelling rather than promotional communications (JÄRVINEN; TAIMINEN, 2016). From the PA perspective, the "storytelling" might include the entire value chain, making different industries feel like active participants in each other's stories, allowing them to perceive their influence. In this case, the discussion is about more than the product as a plastic additive. The complete plastic package should be included in the storytelling, which helps any organization comprehend the role of additives and how they can incorporate it in their processes.

# 3 METHODOLOGY

In this section, the objective of constructing a customer journey for plastic additives in mechanical recycling is revisited. And the path represented by figure 3 will be followed. The global purpose of this project is to understand customer needs in changing market conditions. As mentioned in the literature, each company has different personas (a buyer, a customer, and a user). The personas must be identified using research and interviews . Internal and external maps were made based on internal stakeholders' knowledge of things such as technicians, business development teams, marketing, and sales to define which personas to interview.

Figure 3. Customer Journey methodology




Source: elaborated by the author based on Albee (2015)

Data was gathered from the company and market with the support of a PEST analysis. The method can help to monitor the external environment. This method can help monitor the external environment. Governmental and NGO studies were examined as they complemented the findings in this section.

For internal analysis, the SWOT methodology uncovers the company's main strengths, weaknesses, opportunities, and threats so that it can develop a new marketing strategy. First, the company uses

internal data to find which stakeholders the project should interview (personas), chasing a multistakeholder analysis. Then, using a preconceived questionnaire, it is possible to understand stakeholders' pain points, as well as how they work to address recyclability.

The NVIVO platform was used to analyze interview results. This tool organizes and investigates the qualitative data by transcribing interviews with audio or video files. As a result, it delivered accurate transcripts used in the data provided in chapter 4.

Additionally, the company implemented an IT system for marketing automation in parallell with this research. It can create and name leads, as well as associate contacts with each customer journey campaign. The journey was designed to use this platform, and therefore, the system's requirements were defined as a starting base for this project.

### 3.1 PEST Analysis

The PEST analysis is groundwork for studying the external scenario. It captures the region's political, economical, social, and technological situations and helps picture its market challenges. Waste pickers are an example of social challenges waste management faces in emergent countries. Since this topic also depends intensely on political regulations and measures, the PEST method comprises the country's main issues.

On the political side, it is important to consider the advancements towards recycling, including laws implemented to expand reverse logistics. Politics also present the connections regarding waste management being made by the government, non-profit organizations, and industry. Finally, political factors explore the country's difficulties through shifts of parties in Union, States, and Cities.

From an economic perspective, opportunities arise for investment and training for the mechanical recycling bottleneck: the collection and sorting. The economic scenario can't be discussed without highlight the social situation that dominates this value chain stage, the informal waste management.

Finally, the analysis includes technological encounters, showing that the industries – especially the ones focusing on recycling – have to acquire equipment and training to deliver high-quality recyclate.

### 3.2 SWOT analysis

The company is facing a marketing shift towards mechanical recycling for plastics. As explained in the literature, SWOT analysis better recognizes weaknesses and limitations, maximizes strengths, and examines opportunities and threats in the competitive environment.

External factors will be easily identified after the PEST process is completed and the opportunities and threats become clear. However, the company is not clear on where to target, whom to access, and how to offer. This stage of examination aims to open the opportunity range and help to elaborate the marketing strategy.

### 3.3 Internal Knowledge and Value Chain description

Many market studies helped to create a first draft of the value chain, available later in Chapter 4. This sketch was validated internally with a few stakeholders to define which market players and positions in the respective company retain more knowledge over additives and how they help to solve mechanical recycling challenges.

This study uses the aforementioned initial mapping to gather hypotheses over industries' moves and partnerships involved. Players with a strong position in the market were also mapped, making it possible to see their value proposition, and where there solutions are still lacking. These characteristics bring several opportunities, and, therefore, personas are established to identify interview targets.

### 3.4 Multistakeholder analysis

The system designed in this study requires a connection from different industry segments, which means that conversation with and comprehension of all segments and stakeholders is imperative. A multistakeholder-based initiative for mapping those connections was elaborated. The previous

internal research pointed a few players as critical interview participants based on how the industry influences the plastic supply-demand and the recycling market.

The data gathered in the internal data analyses and information brought attention to a few key accounts Company X has that could enrich the interview process. The company's main business is between resin producers and masterbatches. Therefore, talking to them was crucial not only for relationship reasons but also to comprehend their moves on plastic mechanical recycling.

The second step was to define which stages of the value chain could bring more value to the research. Since some converters can manage recycled polymer with the support of a few additives, this player was worthy of a dialogue. Next and closely in the value chain, the brand owner is responsible for package demand. Still, it was unsure of their knowledge over additives and how they design their packaging with recyclability awareness for the research. The only player mapped downstream was the recycler, since the project had interest in organizations that might be influenced by additive usage. The personas defined for each industry are available in the table 1.

Table 1. Personas definition according to the respective industry

| Industry | Persona |
|---|---|
| Resin producer | Technical Lead |
| Masterbatch | Technical Lead |
| Distributor | Management |
| Converter | Management |
| Converter | Technical Lead |
| OEM/Brand Owner | Package Designer |
| OEM/Brand Owner | Technical Lead |
| Recycler | Technical Lead |

Source: Elaborated by the author

The presence of the distributor in these interviews was a choice to comprehend the middle agent, which buys upstream and sells downstream. This persona is not producing but brings the knowledge and value from its suppliers to small and medium sized companies. Clients from different value chain steps were reached from the inner connection, and after the personas were defined, the invitations for interviews were sent.

### 3.5 Interviewing in Qualitative research

When modeling and managing the value chain, qualitative research plays a relevant role in B2B marketing challenges (CIESIELSKA; JEMIELNIAK, 2018). By doing so, the enterprise has a complete understanding of customers' needs, how the value chain connects, and if its structure changes. This work has the privilege of documenting a case study study from an inside perspective and therefore conceptualizes the problem and captures how value is created in this market. Before this inside perspective is consolidated, an external orientation of the writer's nature's reality is examined to define what knowledge is produced. The writer is a Brazilian focusing on Production Engineering and this work's exposure has bases in this field and will analyze the market to enrich academic research. It delineates the process, rather than the outcome or product.

Internal and external stakeholders were interviewed with an interest in gathering information over Company X and their perspective of how this company should engage the market. This helped to address a real problem and market trend – a technique which Merriam (2009) named "action research”.

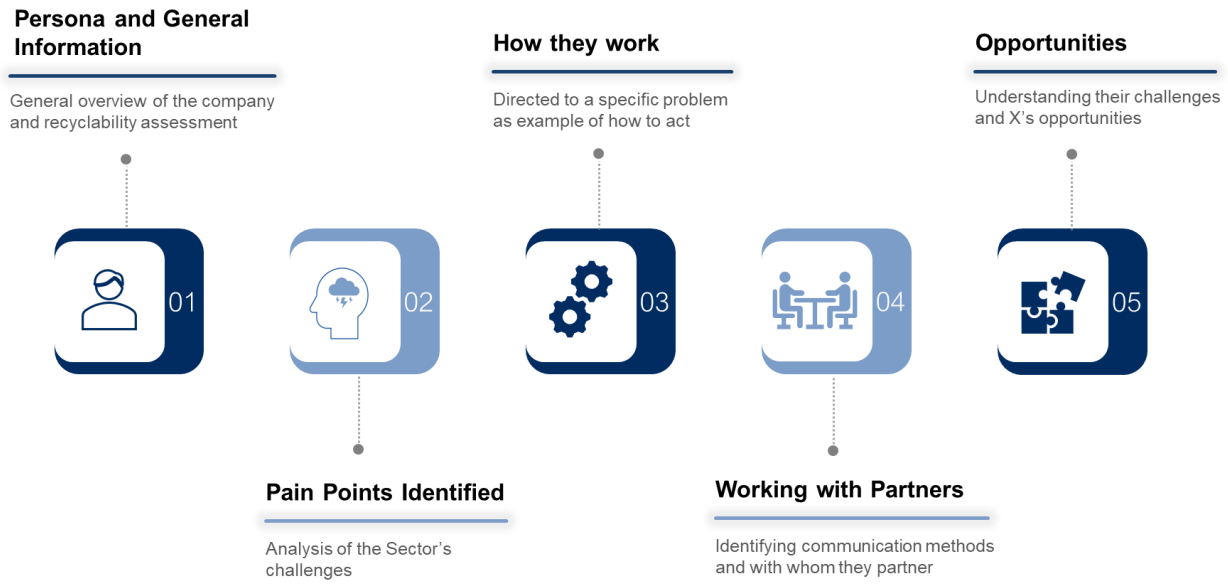
The purpose of the interview at the internal level is to gather the qualifications and competencies required to implement a digital marketing strategy. The researcher established certain areas of variation and acceptance, encouraging the interviewee to speak spontaneously. It is essential to note that researches were conducted in two distinct regions: Europe and South America. The internship was in Europe, following a global digital strategy born at the headquarters. On the other hand, the industry interviews were made in South America, specifically Brazil.

Characteristics such as openness, cultural behavior, psychology, and experiences are perceptible throughout the reading. B2B interactions pursued here are entirely different between the regions

studied, even with a standardized questionnaire, which is available in Appendices A and B. The goal is to obtain their experiences, perceive reality, and gain perspective from the people interviewed (CIESIELSKA; JEMIELNIAK, 2018), based on qualitative researchers' interests (MERRIAM, 2009 p.23).

Two criteria were taking into account for the research development: the sequence of questions asked and the content. Standardized and structured interviews are most often used in qualitative research to verify hypotheses formulated previously, but the unstructured style provides the possibility of getting the most profound insights (CIESIELSKA; JEMIELNIAK, 2018). Hence open-ended key questions are included in an entirely reflexive or intuitive nature, for example, "what do you think should be Company X's role in the market?". The questionnaire structure is represented in figure 4 below, where the path towards Company X's role in the market is drawn by a perception of the persona's activities.

Figure 4. Questionnaire structure for external interviews




Source: elaborated by the author

An interview should have a conversational nature and include knowledge of the market movement, industry segmentation, and organizational culture. The questions about the persona's role intend to capture such corporate culture and if this role would change with a new product for a new market segment. It is also necessary to measure the stakeholder influence in decision-making regarding mechanical recycling and the business's core values. Finally, such structure, based on the studies explicit in chapter 2, assists persona development.

The second and third sections of the questionnaire seeks to understand both the persona's and industry's challenges (pain points) and how this is addressed internally. These sections also serve to keep track of which departments are involved, how they work and how they are structured. Consequently, the next round of questions raises information on how they work with partners. Finally, the third section aims to acquire knowledge on whether personas and industries can handle its challenges alone or search for solutions in the market.

The final part of the interview was developed to understand Company X's role in the market from the interviewee's perspective, as previously mentioned. The interviewee's issues usually come in this part since it is easier to project problems as something a third party can solve. Here the market's pain points are explicit, and a value proposition can be taken.

### 3.6 Customer Journey Mapping

It is necessary to map all possible interactions across touchpoints and channels in a journey when creating an individual customer experience. Since the project's goal was growth and lead generation, the first interaction with the customer was the primary target. Primarily, the acquisition phase will incorporate a formal press release, a restructure of the landing page, request information through the "Contact us" page, and request sample and webinar as an entry point.

Secondly, a nurturing phase comprehends the email campaign provided with the Marketing Cloud automation studio. A series of email steps was designed to attract the customer back to the pages and the aforementioned campaign. Finally, it was important to define where the journey ended to each path described.

A few flow scenarios were delivered to the department. The journey has reentry points, splits, and exits considered in the model. An excel model was created to calculate possible lead generation with the current status. The model constructed will help the user identify paths for improvement using the existing data.

# 4 RESULTS AND ANALYSIS

This chapter will consolidate all steps of analysis and research made to acquire knowledge, as well as insights of where to drive mechanical recycling for plastics. In addition, it contains a socio-political and economic overview of the Brazilian scenario and how the plastic-value chain is adapting to current changes. Aside from market struggle, the industry's main encounters turn out to be environmental – cultural, regulation infrastructure, waste management, and multi-sector organizations.

With the country’s characteristics in perspective, the private sector connects differently as seen during interviews and analysis. Based on their actions and market involvement, Company X tries to locate a spot in the value chain where a PA provider could insert more value. For that, it is important to gather internal information to combine business strategy and competencies with market opportunities.

A SWOT analysis is made based on the plastic value chain and the repositioning of a PA provider in the case of mechanical recycling. The analysis intends to define the PA provider’s main opportunities to insert itself into this market based on its internal characteristics while monitoring the external environment through a PEST analysis. The study can help target which industry has a higher impact on circularity and is more effective on a short-term basis.

Qualitative research based on managerial and technical stakeholders from each player in the plastic value chain was done and contributed to this work, directing the study towards personas from the polymer and masterbatch industries, distributors, brand owners, converters, and recyclers. A questionnaire was developed to acquire the industry pain points and challenges in the recycling theme, with personas engaged between customers and personal connections. Those interviews were set virtually with a maximum duration of 60 minutes.

From the interviews and previous analysis, it was possible to identify opportunities for the PA provider to best engage with the market segment. Based on the challenges, content creation is boosted through the marketing automation supported by Salesforce Marketing Cloud. A digital

customer journey for this industry can then be mapped, allowing the identification of touchpoints and engagement openings.

## 4.1 PEST analysis

PEST analysis demonstrates the four central and distinguishing characteristics to help understand the challenges Brazil faces when it comes to advancing in mechanical recycling and reverse logistics. It is a low-income country, politically divided and with discrepancies between formal and informal waste management.

Although the country can have a range of development, having the bottleneck for mechanical recycling on a socio-economic status means that this issue is far from being resolved within the private sector. Despite this, some pain points highlighted that relying on socio-economic status was seen as an attempt to conciliate public responsibilities and organizations involved in the plastic industry.

Nevertheless, the social issue involving collection and sorting couldn't be left out of the analysis. The door for management optimization of cooperatives was found in literature, therefore it was noteworthy that the private sector could intervene. All part of the analysis made it possible to realize where organizations can proactively assist.

### 4.1.1 Political

This section will focus on the recent changes in the plastic packaging industry in Brazil. Brazilian laws show a slight advancement towards packaging when it comes to its EPR (Extended Producer Responsibility) sectoral agreement (BRASIL, 2015),composed of more than 3700 producers and manufacturers, cooperative groups, and Environment Ministery's (MMA, Portuguese acronym) intermediation. The agreement calls for reducing the packaging waste thrown into landfills by 45% by 2031.

The National Solid Waste Management Policy (PNRS), acronym in Portuguese, establishes that the products' life-cycle is a shared responsibility of its producers, distributors, retailers, consumers, and public waste management. In addition, the policy exemplifies possible adoption measures such as purchasing used packaging, making voluntary delivery through cooperatives, or “waste-pickers” associations (BRASIL, 2010).

ABRE, the Brazilian Packaging Association, is a national entity representative for the whole packaging value chain, including machinery suppliers, raw material companies, converters, packaging users, and design agencies. It is also part of the sectoral agreement, an association dedicated to recycling promotion, CEMPRE, responsible for coordinating Reverse Logistics and intermediate communication between MMA and the sector. The association comprises Coca-Cola, Danone, Nestlé, Pepsi-Cola, SC Johnson, and several others. On the plastic side, the Brazilian Plastic Industry Association, ABIPLAST, acronym in Portuguese, is also significant towards the circularity of the material. ABIPLAST is the most active plastic in the country.

The integration of key stakeholders in government and associations allows the advancements that are still far from ideal. The policy goal is to enable cooperatives, unite the private market through the sectoral agreement and assist reverse logistics implementation. It establishes regulations for separation, discard – through selective collection or cooperatives, transportation, screening, classification, and destination according to item VII, articles 3 and 47 of Law 12.305/2010 (PNRS).

Ten years after the law implementation, the goals established are far from concrete. There is a disincentive towards recycling coming from double taxes, applied in both production and recycling. Additionally, the current situation requires union and shared responsibility from all levels of government, which Brazil historically lacks.

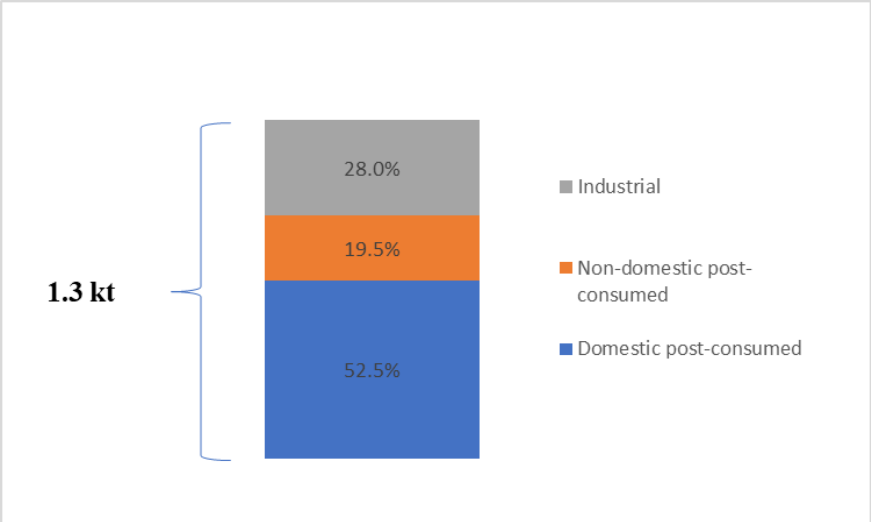
### 4.1.2 Economic

Brazil is one of the biggest plastic consumers in the world. It is responsible for 57.6% of Latin America’s thermoplastic resin production (ABIPLAST, 2019). Unfortunately, it is one of the the top 5 countries with the highest rates of plastic in landfills. According to Pimentel Pincelli et al.

(2021), 85% “of the plastic packaging waste was collected by mixed collection, and disposed of in landfills, controlled dumpsites and dumpsites”.

Compared to other emerging markets, the production of recyclate of polymers is relatively small. According to a study promoted by market analysis and an intelligence company focused on the chemical industry (MaxiQuim), alongside PICPlast (Plano de Incentivo à Cadeia do Plástico in Portuguese), the plastics’ mechanical recycling production involves various steps and business opportunities. In 2019 the business generated more than 18 thousand jobs and increased its processing installed capacity by 2,6% (approximately 2ktons). Figure 5 shows the relation of origin for recycled content, with the respective total production in 2019 of 1.3 kt of resin.

Figure 5. Volume of the recycled residue by provenience




Source: Adapted from PICPlast/MaxiQuim

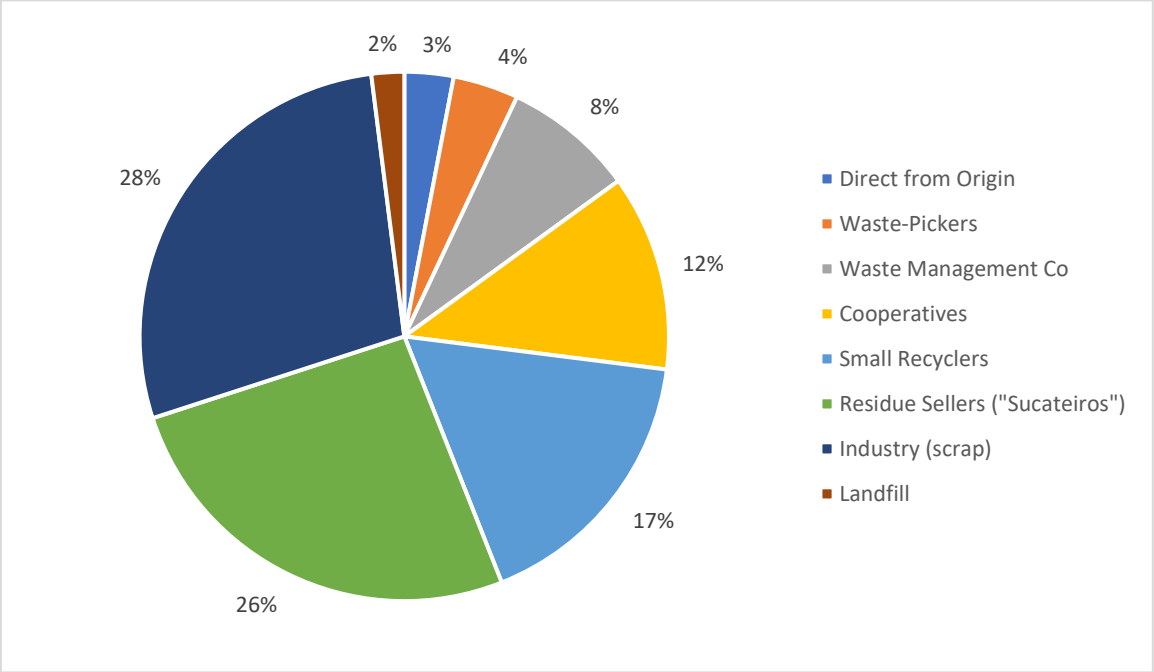
The data details that the industrial residue is based on the petrochemical industry, plastic transformation, and plastic recycling. The volume for industrial and domestic post-consumed recycled content decreased from 2018 to 2019 by 0.4% and 1.8%, respectively, while non-domestic post-consumed increased by 2.2%. This data reflects the market's struggle towards the type of material that is valuable to recycling and the poor waste management regarding the decrease towards domestic post-consumed. Also, the increased demand for plastics is not followed by the

recycling capacity, justifying the need for investment in the sector. As a result, what becomes residue is half of the country's total plastic demand. 10,6% of the country's production becomes Post-consumer Recycled (PCR), an equivalent total of 757,6 thousand tons (ABIPLAST, 2019).

The biggest consumers of PCR are Personal hygiene and household cleaning (18%), civil construction (13.3%), beverages (10%), clothing (9.1%), and housewares (9.1%) (ABIPLAST, 2019). Recycled resin is also consumed by automobile, agriculture, and construction industries but not the scope of this work.

When it comes to the provenience of waste acquired by recyclers, the country has a wide range, as shown in figure 6. The diversified waste management of the country is the bottleneck regarding recycling. Each municipality has its particularities and might vary, but the action of cooperatives, "waste-pickers", and small recyclers proactively collecting residues are part of this economic reality.

Figure 6: Volume of the recycled residue by provenience.




Source: Adapted from PICPlast/MaxiQuim

The volume of recycled residue per origin is concentrated in the South and Southeast regions, together they are responsible for 75% of the total. However, even with high rates, the study points

out that approximately 35% of the recycled volume consumed doesn’t have the same state as its origin. Those results open space for a deeper study over post-consumer waste logistics to improve the recycling value chain.

Research shows the positive impact large industries such as Braskem are having pursuing recycling opportunities. The company involves clients, recyclers, cooperatives, and brand owners to increase the amount of recycled content for external and internal consumption. The company launched its own platform, Wecycle, where it markets its recycled resin. As a resin producer, the responsibility for exchanging the polymer’s origin lies heavily in this sector, and the increase over recycled resin’s demand turns the business profitable. The research points how the value chain is moving to adapt to the circularity of plastics. The hypothesis is a collaborative work between segments proven with Braskem activities and the political coalition example.

Brazil shows an increasing capacity for recyclability and the industry is willing to unite for a common goal. The multistakeholder interviews aimed to understand the industries' most significant challenges involving mechanical recycling, how the industries partner and what is still missing from a solutions perspective. The goal was to show how the economic scenario of the country affects or even creates those challenges.

### 4.1.3 Social

Brazil has approximately 500.000 waste pickers (Internal consulting report). According to the country’s census (INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA (IBGE), 2010), this number estimates 400.000, where 57% collected recyclable waste. Informal collection passes were 24% higher than formal ones (PIMENTEL PINCELLI et al., 2021). Therefore, waste management is a socio-economic aspect, as well as environmental, where the work conditions are precarious and the hygiene is low. Furthermore, according to Pimentel Pincelli et al. (2021), the lack of institutional control, legal requirements, and technological capabilities increase this work's risk.

One social impact that PNRS brought was the formalization of waste pickers, who are now legally integrated into municipal waste management and professionally recognized by the Brazilian Ministry of Labor and Employment (RIBEIRO SIMAN et al., 2020). Though society still tends to neglect these professionals, incorporating the workers into the system is moving slowly over a management-operation perspective, which Ribeiro Siman et al. (2020) discuss.

As seen by the study in Figure 6 and supported by Ribeiro Siman et al. (2020), Waste Picker Organizations (WPO) integrate the cities' waste management and improve collection and sorting. Although this could help the bottom neck in increasing the supply of recyclate content, it is still far from efficient. Social issues such as exploitation and poverty cause a chain impact on the structural capacity. The WPOs are now trying to include waste pickers in informal situations by training and promoting environmental education. One of their main difficulties is the financial dependency of the public sector (RIBEIRO SIMAN et al., 2020).

The collection infrastructure presented in the research by Ribeiro Siman et al. (2020) identifies the gap for being operationally efficient. Between collecting, receiving, sorting, pressing, baling and commercializing the dry solid recyclable waste, numerous activities and aspects are needed for improvement. They identified the main reason for low economic sufficiency: the difficulty in adding value to the materials received. Still, the research points to hope in increasing capacity with the right governance tools.

One important factor that was out of the scope of the Ribeiro Siman et al. (2020) research was examined by Pimentel Pincelly et al. (2021). They found that there was a huge social problem due to informal collection based on non-regulated activity composed by household waste collectors, itinerant waste buyers, dumpsite pickers, street pickers, and cooperatives. Until government regulations and social organizations formally allocate these members of society, very little can be done. Ideally, several sectors could provide the management support and training of the WPO alongside the integration of informal members.

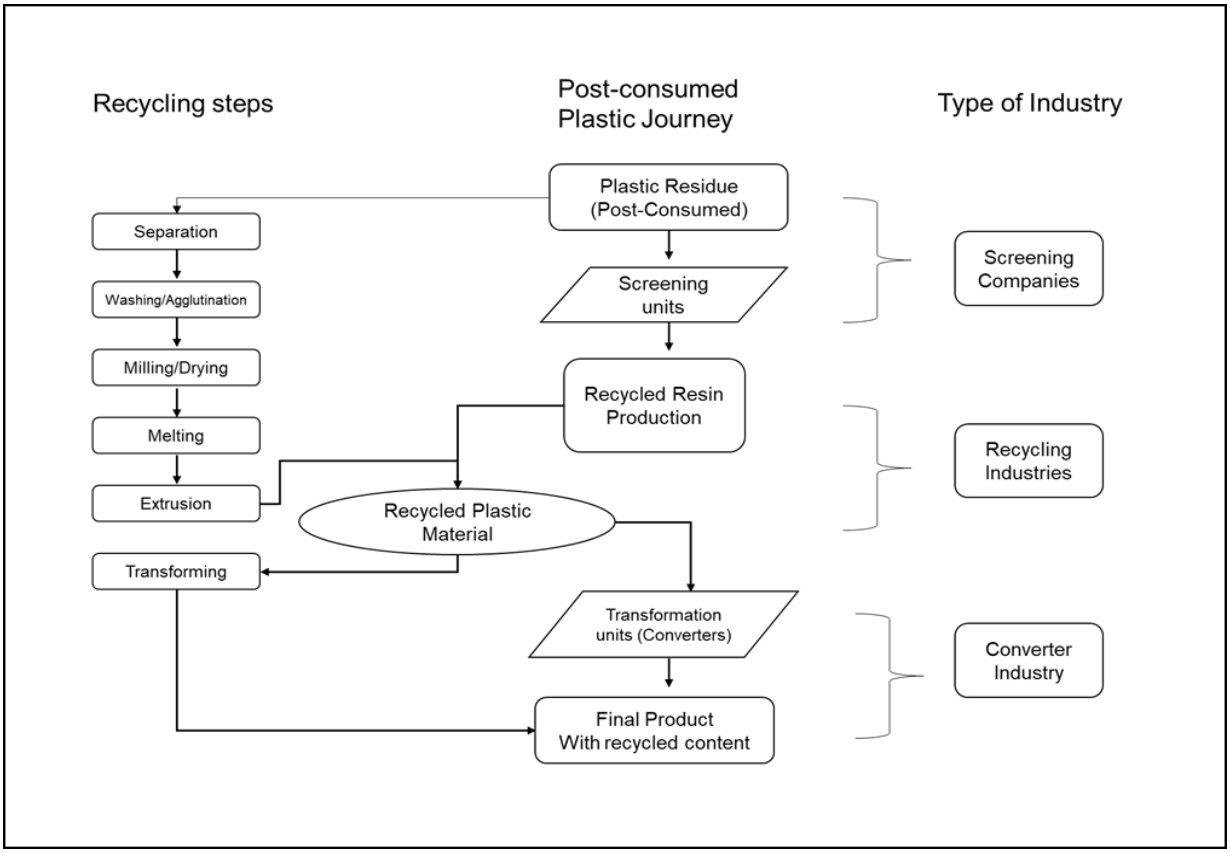
### 4.1.4 Technological

When it comes to recyclability, technological challenges are particular to each country. In Brazil, for example, Health Ministry regulations allow only PET post-consumer in multilayer packaging for non-alcoholic carbonated drinks (ANVISA, 2016). This is one example of limitations for recyclate applications in which each recycler must be aware. On the other hand, the applications where recyclate is incorporated vary due to market demand and profitability. Therefore, it increases the differences and market positioning the recyclers in the country have and consequently, the range in technology discrepancies between them..

To guarantee the success of polymer recyclability, four primary conditions must be attended: adequate organization for collection and separation, sufficient technology for conversion, market demand, and economic viability (SPINACÉ; DE PAOLI, 2005). The first condition was discussed in the social and economic analyses. The second will be part of this section and discussed in the interview analyses and results. Thirdly, market demand for recycled content is increasing as studies continue to support it. Finally, economic viability directs recyclers between civil construction, textiles, automobiles, and packaging where 40% of the plastic production is inserted. In other words, long-life cycle products have a preference to utilize recycled content for their high aggregated value.

The mechanical recycling of plastic contains several steps for reprocessing, which vary for each recycler. Some of these processes are described in figure 7 and exemplified here as opportunities for advancement. As mentioned in previous sections, the collecting and sorting phase is troublesome (primarily manual), therefore the washing and separation phases are intensified in this industry. An automized separation would be ideal for the technological infrastructure in recycler facilities, however it is expensive.

Figure 7: Recycling steps and main industry agents




Source: Adapted from PICPlast/MaxiQuim

The technological support must correctly work with multilayer and mixing polymers, which is possible depending on the machinery and additives utilized. After separating and cleaning, the residue passes through a milling process, becoming "pellets" before the transformation. Then, once again, there is another washing and drying stage where another additive set is added, for example, antioxidants and plasticizers.

Technological difficulties occur in recyclers' work when they have to handle contaminated material, experience problems in the cleaning process, have a lack of machinery financing, and more (PACHECO; RONCHETTI; MASANET, 2012). In this work, it was noteworthy that some recyclers are informal due to a lack of fiscal incentives and don't open their doors for technological partnership and support. Because these people are informal, they opt to work in an isolated fashion,

making the research and development of recycling technologies at their site and at universities difficult.

### 4.2 Internal knowledge

The consolidation of knowledge inside the company was crucial for two reasons: it enlightens the current strategy and highlight their new business opportunities. This section comprehends the company’s bottleneck towards recycling and which direction their materials and consultancy took them. This section combines three business functions: technical production, technical marketing & sales, and business development.

The technical production team retains knowledge of applications and operations. If a new product was developed, they were the first to approve and coordinate processes. For plastic additives, they are the most valuable in product knowledge creation. They comprehend customers' needs in the first encounter on the factory floor when delivering a product or providing testing before a purchase is made. Therefore, this group brings pain points and opportunities over product creation, client interaction, and insights over which industries Company X should approach.

The technical marketing & sales team, on the other hand, focuses on putting the product on the market. This team is responsible for attracting customers, creating marketing activities, participating in fairs, and managing existing relationships. This group brought the “first-approach” perspective and how the customer engages with Company X.

Management and new business development contributed to this work for its motivation towards mechanical recycling and past mistakes. Their awareness of the topic and urgency to achieve new markets is noteworthy. The three categories described here will enrich the project view over which industries segments lack understanding.

### 4.2.1 Technical Production

A company with decades of experience brings along a structure that requires assistance through change. Any changes in the portfolio will not affect technical production competencies or influence customer interaction. That being said, the knowledge of this team involves challenges in production towards new business development and current customer's needs. The value chain upstream has years of involvement with resin producers and masterbatch companies, which gives (the production team) a biased view of who to target.

The production team's expertise in polymer processes is an advantage if the recycler is integrated into its business. Since the first industry is part of Company X's customer segment, it is responsible for closing the first triangle with polymer and recycler industries as vertices. Since the most significant technical challenge is to control the waste stream, they agree that working with sectors that promote such a waste definition would benefit research and development.

The quality of the material depends on the purity the recycled content has. The technical support would have to examine and determine what additive combo fits best to each stream. Company X's specialty is in stabilizing the polymer but cannot yet specify a polymer-product relationship. Therefore, the Company would have to partner with the polymer producer and ultra-specialized recyclers to provide additives.

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Difficulty in this sector comes with multilayer designed packages developed by converters. It is unknown if the technical side brand owners request such complexity. An interesting discussion brought from the technical field to the marketing view is that the industry doesn't comprehend the plastic additive's value downstream. Therefore, a further discussion with stakeholders from brand owners must be held.

No one fully comprehends what to develop for the recycling industry. This becomes a marketing issue, meaning that the marketing team must approach the industry with a portfolio, technical knowledge and strategy of working together to deliver value. Recycling was not part of Company X's scope, therefore educating them on how additives can increase their performance and bring value to the industry is new for Company X. On the other hand, this value should be reflected in the recycling material price or the industry will continue turning to virgin polymers.

### 4.2.2 Technical Sales & Marketing

Sales bring the market perspective, the changes, and the willingness to use recycled content, especially through legislation pressures. The additives are made to support plastic's life-cycle and be recycled multiple times. When the plastic passes through heat cycles, additives avoid a downgrade in the material. Once the product is in the recycling process, additives are provided to wash and restore the plastic's mechanical propriety.

The South America team is acting as front runners by uniting several industries to close this loop. They could integrate departments to pursue solutions, based on a small organizational structure in their Sao Paulo office. The competitiveness in the portfolio comes from the clients being able to test the products by themselves and mix them without complications. Current clients were already trying to work with recycled content, and the existing solutions for recycling are attracting new clients. This is a reason to focus on a new marketing strategy.

Solutions are driven by the small business in recycling and the take-in-hand posture of brand owners. Therefore, solutions are being pursued to simplify complex processes in the industry. The technology's lack of communication will be beneficiated by easy-to-mix solutions provided by the organization. According to market necessities, the current solutions can be upgraded from time to time, but what they are presenting is a recycling industry that is new to the business and eager for technology help. South America's team can supply recyclers with current solutions while being challenged by this new player's difficulties.

Their priority is to establish the recycling products in the market and then move on to new business development or even new services. The challenge about future steps involves the continuity of uniting different business units. As mentioned, the plastic industry is composed of several players, and each has its own challenge. The PA department alone can't provide all solutions to the whole chain, but Company X can, in theory, integrate it.

Polymer producers are the most prominent players in integrating mechanical recycling in South America. They have investments in this field, and the triangle closes with masterbatch producers supplying additives to them. This triangle influences brand-owners to be aware of solutions alongside its converters. The question for brand owners is to find out to what extent new packaging can incorporate recycled content. The converter will need, in most cases, a percentage of raw material needed for the recycled polymer. The process requires studies and knowledge from technology and equipment, in which converters would need to invest.

Masterbatch is a current industry customer from Company X and is willing to use additive solutions for recycled content. Therefore, it is not a matter of identifying clients in this segment but of which value is being offered. From the in-house perspective, Masterbatch is not expecting new solutions or advancements besides the current portfolio. South America is already anticipating market expectations and will launch a new recycling platform and evaluate the market reaction, described later through customer interviews.

The PA providers do not see themselves as the fixer of this market's problems. But as an organization, they believe this company can facilitate union. A project with Agriculture Solutions was given as an example, where the container should be collected and recycled because of strict regulations existing in Brazil over pesticides. This is an example of how rules, when well-applicable, have the right impact on recyclability.

The current internal project aims to consolidate the picture towards mechanical recycling and pursue new areas for possible development. The expectation coming from the South American office is that all other regions will prioritize mechanical recycling in the same way they are. When regional business units combine efforts and focus on one goal, more solutions are developed.

### 4.2.3 Business Development

This team has a vision of how the market is responding through the years to the recycling topic. Products and processes differences between 20 years ago and now are visible, but the challenges remain higher costs involving reprocessing polymer and chemical difficulty in addressing waste. On the other hand, what changed was the sustainability goals brand owners publicly pursue combined with worldwide regulations.

Another positive impact on incorporate recycling is the capability to supply the increasing demand for plastic. The industry cannot increase production on the virgin material side, so the recycling movement pursues balance. It is known that brand owners have monthly meetings to address circularity issues in Brazil. The scenario shows that **no one has a solution domain**, therefore it is probable that they will try something together. Since the team is entirely from one business unit, Plastic Additives, their central role is to sell specific ingredients that compose plastic. They see, however, the necessity of Company X to position itself as an organization to direct the market because this is how the market sees it.

PA South America’s target industries are resin producers, masterbatch, and recyclers. To reach them efficiently,  the organization united three other BUs that can provide mechanical recycling solutions: one for washing solutions, plastic additives with antioxidants and light stabilizers, and another specific PET solution. The successful integration of those units' solutions brought a buzz in this market about what recycling will achieve.

One business challenge involves the Masterbatch Industry. It is a well-connected segment with a solid relation to OEMs and the Converter Industry. Since a Masterbatch also provides additives solutions, it is uncertain which strategy to adopt for them. It is still unsure how to partner, as well as if it will deliver a different value proposition to avoid competition between the industries.

### 4.2.4 Digital Marketing

Digital awareness and attractiveness became a trend for Company X in 2015. Responsible for creating the marketing material and developing the digital strategy, this team works with customer journeys to evaluate how to do business. This process is currently being improved with marketing automation tools.

A group responsible for digitalization topics was created in 2015. Its role was to support all operating divisions, but each BU has its digitalization cluster. Therefore, when a project involves different BUs, this group is involved in implementations.

There are internal differences between digital teams in operational divisions as well. In PA, they look into the current portfolio, check which business they want to grow, start from one, and build the strategy. In Nutrition & Health, for example, they were allowed to be bold because their portfolio had products with multiple industry buyers. To each, another set of approaches were possible. The main pain point is related to which market the company is offering, and then the customer journey justifies how to manage digital tools towards each market. From a B2B perspective, it is enough to know that sustainability is a new trend and the customer might care about it in the future.

Company X has numerous marketing tools such as marketing automation, campaign steering, website analytics, and accounts on social media channels. The availability of an instrument is not the only important matter, however; they also need awareness and training towards the usability and practical skills behind the tool. The organization passes through a management change triggered by digitalization topics, and now those changes trigger digital marketing content. Some marketing activities such as SEO, Search Engine Advertisement (SEA) are existent but with limited resources.

Still, the origin of the problem is over an organizational matter. The responsible person for marketing and sales of each department has the awareness task in hand, inspires the utilization, and aligns the business objectives: growth or improvement of their relationship with customers. When asked about what the company is doing to address the staff’s enablement towards digital, each BU

must decide its goal. The current work is to decide where to focus if there are new trends, for example. Then, the digital marketing team presents those trends and the strategy towards the customers by promoting customer journeys and deliver to the business.

The digital marketing team teaches PA how to use their journey, specifically how they can iterate, adapt, and change according to their feedback. The marketing tools need someone responsible for data management and data quality because it is a massive task. It is necessary to have someone on an Operation Division at a global level. One challenge is to keep few people managing the marketing tools available. IT implementations must be explained through training and enablement.

In the end, one last challenge was found: the staff must be curious and interested in testing and using the platforms. It is hard to motivate and instigate enough curiosity within the team for them to effectively use the tools. Priorities are pre-established from current workers, which means that any additional resource introduces one more task to learn and new skills to develop within a short time.

### 4.3 SWOT Analysis

On Strengths strategical factors, Company X has a segmentation structure that allows penetration and market comprehension. For example, in plastics additives, the industry presence broadly captures industries that utilize the product in an agile way. It also controls a strong distribution network worldwide, with regional offices in four continents, allowing them to reach the market faster. Besides that, their go-to-market team is highly efficient in marketing and sales.

On the other hand, the same structure might reveal part of its Weaknesses since its PA department can’t respond as Company X, and the market expects. This was also one point customers highlighted in the customer interviews. Moreover, when it comes to recycling, the needs go beyond PA. Therefore, the department is limited to extensions of product segments or services. Also, the financial structure obeys the segmentation. Consequently, the resource utilization is not the same

through Company X. Finally, the value proposition is not clearly defined on the marketing side, losing space to competitors.

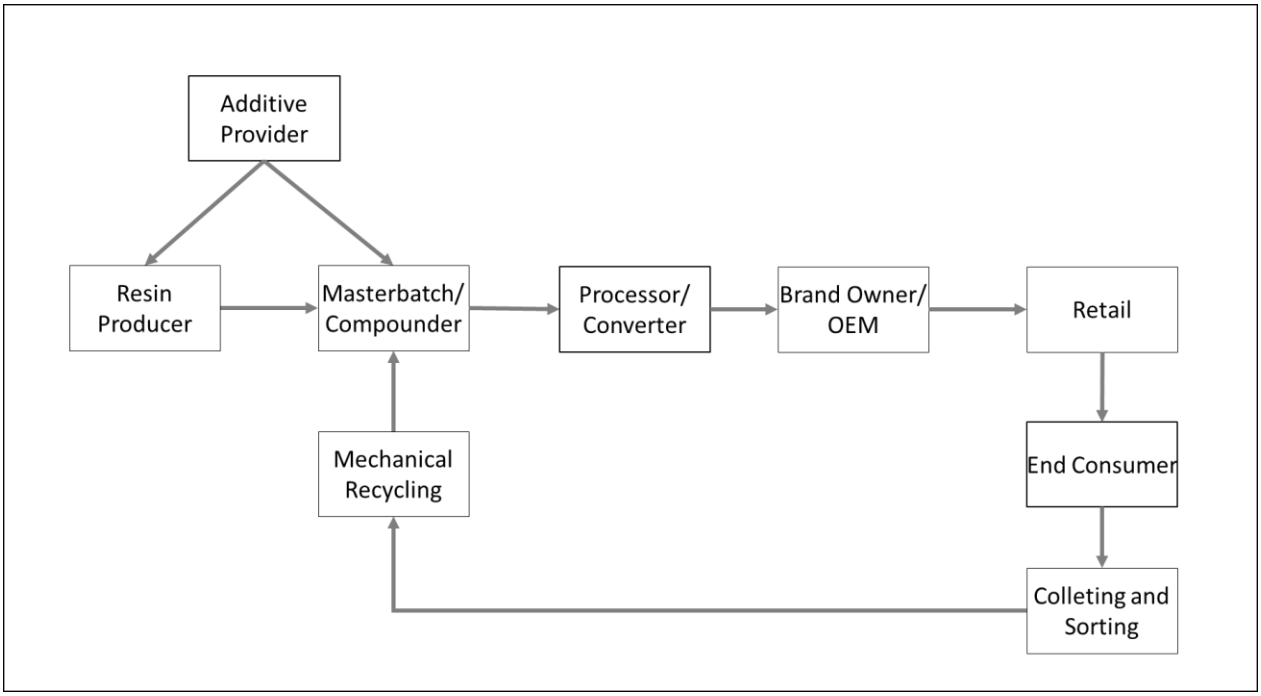
New market development is an excellent opportunity for such a company. The robust technology positioning PA has, enables them to provide a unique product within a curious and in-need market. Marketing is included in this organization's weaknesses, but digital might surface as an opportunity, leveraging it with a better comprehension of customers. The tool implementations seen within this work prove they are elevating their chances.

Finally, the Threats this company faces and reflects at PA include losing the market for not acting fast enough. The recycling market development started many years ago, and it is still unclear how and where (towards which industry) they will position. There is no regular supply of innovations in a scenario that requires constant development. Besides, each country has different standards in recyclability and additives usage. Therefore, the structure must have a faster decision-making process to perform as this market requires or lose space to competitors.

### 4.4 Plastic value chain description

When discussing supply and demand, the plastics value chain comprises polymer producers, masterbatch and compounders, plastic additives providers, distributors, processors (or converters), brand owners (or OEMs), retailers, end consumers, collection and sorting, and downstream recyclers. The analysis will be made from a challenge-needs perspective based on internal data gathered and value acquired through the PA business. Figure 8 describes the initial stage of view, proposing a linear model of the value chain.

Figure 8: Plastic Value Chain - First view




Source: Elaborated by the author

From the perspective proposed in Figure 8, each of the industries was mapped, demonstrating possible trends and patterns internal stakeholders believe or have seen in the market. Thus, the figure is a hypothesis proposed and validated with the research, market data, and internal analysis. It represents general supply-demand relationships.

A polymer is a long molecule (or macromolecules) produced from monomers through a process called polymerization. However, the polymer (or resin) industry also has a range of polymers that, when blended, complicate the recycling process. Additionally, the polymer application returned from recycling is only possible for some plastic types, such as PET (HAHLADAKIS et al., 2018). So then, the recycling awareness for each polymer production and its composition starts with this industry.

This study explains how the recycling industry's entrance can shape the whole value chain into a collaborative relationship among partners. Additives solutions can close the plastic cycle with a sustainable material strategy. This creates solutions that increase material processability, usability, and polymer compatibilization from conception.

The second stage of view is represented by the masterbatch industry and processed plastics industry (commonly referred to as a converter), carrying the proper color and design responsibility to the requesting company (OEM/Brand Owners). Additives are inserted in this stage with pigmentation stability and guaranteed flexibility of the final product. Unfortunately, the composition of additives is sometimes exclusively defined by the masterbatch, usually without knowledge of the technology behind the packaging offered for the Brand Owner.

The third stage of view goes to the brand owners and retailers involved after packaging. The owners of the design chosen have the most substantial bargaining power in the whole value chain because they control the polymer necessity, color and flexibility application, as well as the production scale. According to ABIPLAST – Profile 2019, packaging application production has the shortest life cycle (less than one year) and has significant participation in recycling content. Brand owners that hold strong influence over the market are powerful enough to differentiate portfolios and adjust to what the value chain needs.

Finally, recyclers and sorting facilities manage the technology for separation and cleaning, as well as reprocessing the used content. These technologies are expensive and time costly, which is why there is an increase in value for recycled material. Firms have to decide whether they want to make high purity content to those who can afford it, or if they want to create compromised quality to sell at lower prices. As a comparison, the recycling companies in the ABIPLAST Profile represent 10% of the processing industry.

### 4.5 Qualitative research

A An interview questionnaire was designed for this study, initially capturing the marketing stakeholder's position. Interviews were conducted to validate the hypothesis created with internal knowledge. The objective was to draw another market view where Company X can develop its

business, focusing on current market trends. Secondly, the questionnaire investigated what could change the stakeholder's perspective if the firm focused its portfolio on new business development for this segment.

The project goal is to develop a digital customer journey for at least one persona. Interviews were made with external stakeholders to draw an interaction map between enterprises. With the persona and journey defined, it was possible to utilize digital tools to automate this journey. Before creating such a journey, it was essential to comprehend the internal knowledge, tools, and competencies towards digital marketing. Then, with an inner panorama, consolidate the possibilities towards a strategy and align it with the Recycling scenario. With this goal, the personas mentioned in section 3.4 were invited for a virtual call. The relation of roles, days, and duration are represented in table 2.

Table 2: External interviews scheduled with roles correspondency

| Industry | Persona | Position in the company | Date of the interview (d.m.y) | Interview length |
|---|---|---|---|---|
| Resin producer | Technical Lead | Circular Economy Coordinator | 04.05.21 | 00:53:13 |
| Masterbatch | Technical Lead | Vice President/Operations | 22.04.21 | 00:45:59 |
| Distributor | Management | Owner | 30.04.21 | 01:04:01 |
| Converter | Management | Sustainable Projects | 07.05.21 | 00:57:34 |
| Converter | Technical Lead | Product Development | 19.02.21 | 01:07:09 |
| OEM/Brand Owner | Package Designer | Package Development coordinator | 17.02.21 | 00:52:09 |
| OEM/Brand Owner | Technical Lead | Coordinator - Sustainability in Packaging | 07.05.21 | 00:52:15 |
| Recycler | Technical Lead | Owner | 20.04.21 | 00:58:19 |

Source: elaborated by the author

As mentioned in section 3.5, the interviews aim to acquire four characteristics of the persona and industry as well as opportunities for Company X.

### 4.5.1 External interview: Resin producer

This interviewee is a woman with fourteen years of experience in Company A and an education background in Chemical Engineering. For ten years, she worked in the technical field and in 2018, joined the organization's Circular Economy team. She and her team are responsible for production and acquisition of recycled material, which includes the quality guarantee of the content on recyclers' facilities. Company A has a core strategy to promote a circular economy, with ambitious global mechanical and chemical recycling goals.

When asked about the main drivers of this market, she replied that the brand owners pull it entirely. Brand owners have public and ambitious goals. They also determine the requirements of recycled materials in packaging. According to the PNRS law, brand owners must recycle at least 22% of the packaging they insert into the market, which is another push to incorporate recyclates.

The main challenge she perceives in the Brazilian market is to acquire material for recycling. The inconsistent material flow demands energy from the whole team. They locate the opportunities to encounter material to be recycled and confront the struggle in sorting. Since Brazil does not have an extensive selective collection and the country still has numerous landfills, Company A tries to tackle landfills as raw material sources. In this area, she presents another business complexity to achieve higher recyclable content volume: investments to mechanize landfills are made but are still projects without investment return. The payback would take at least three more years.

Demand for flexible recycled plastics is increasing, but the low aggregated value compromises its profitability. The alternative for these materials became fuel or chemical recycling since tests for mechanical recycling were failing. The only flexible plastic available for mechanical recycling has commercial provenience, in which a stable market is behind it. Company A pursued then work with rigid plastics on mechanical recycling and currently struggles with odor and color control.

When it comes to finding partners, she mentioned that the communication with Company X was effective. After a webinar promoted by Company X about mechanical recycling, the interest in solutions increased. Company A involves its product development department, application engineers, market development, and the team at the recycler to work with the partner.

The questionnaire moved forward to value chain characteristics, engagement, and image impressions. Regarding the value chain diagram, the interviewee said that “depending on the material you are describing with this flow, the circuit is correct and can return to a masterbatch phase”. However, with domestic post-consumed resin, it is not easier to go back to such an application.

The engagement level described was with the entire value chain, except the end consumer. Two fragile members were mentioned: the recycler and collection and sorting. The activities made with collection and sorting involve cooperatives associations and social stimulus (bonus or credits for package return). Since this company depends heavily on high-quality recycled resin, Company A supports such players through collaboration. “Brazil doesn’t have a considerable number of qualified recyclers to produce high-quality resin,” and to overcome this scenario, they promote laboratory training, analysis tools, quality control and quality management guidance.

The value proposition in working with recyclers comes through the collaboration mentioned. Company A gives technical knowledge to enhance resin quality, and the recycler sells its resin with Company A’s seal of approval. Every partner passes through triage, and nowadays, it is possible to receive the same quality from different players. Being a partner depends on its internal processes, residue provenience and treatment, washing capability, and technical capacity.

A beneficial relationship depends on the recycler's acceptance level for intervention. For example, the quality is unnegotiable, and small players must consent to a change of processes. If this means a material loss, some might not accept the partnership. The small size of those facilities pulverize supply for Company A and the solution for quality control is the assimilation of its laboratories. A cultural shift on the recycler side was required to alter its methods and submit better quality. This change in mindset was considered a challenge for Company A.

The technical knowledge of additives for this interviewee is self-diagnosed as low. She understands antioxidants - used in virgin and recycled polymers - and clarifiers for virgin only. For recycling

processes, she brings attention to the need for compatibilizers and additives to preserve properties. Product development inside Company A would have, according to her, more knowledge over additives. Company X, from her perspective, could support both: mechanical and chemical recycling. Beyond providing additives, the firm could concentrate on a few pain processes such as washing or material selection so that the recyclate can arrive as purely as possible on the converter side. Table 3 gather the main findings for this interview following the structure presented in section 3.5.

Table 3. Interview main findings – Resin Producer

| | |
|---|---|
| General Information | • Chemical Engineer<br>• Responsible for the collection of recyclable material, production of PCR in-house and with partner Recycler<br>• 14 years of experience on a leading resin producer company<br>• A circular economy is part of the company's strategy |
| Pain Points and Challenges | • Collection affects her work of its unstructured waste management<br>• The sorting needs a mechanized system, technology, and investments<br>• Each polymer has a different assessment and requires new technologies<br>• The range of contamination define the final application of the resin |
| How they work | • Creation of a department for collection of raw material<br>• Investments in landfills for collection<br>• Engagement of converters and Brand Owners<br>• Investments in recycling facilities, change of their processes to adequate to A's quality requirements |
| Working with Partners | • Partner with city hall and cooperatives to solve the collection issues |

| | |
|---|---|
| | • Partner with recyclers for laboratory development (equipment and training) to deliver high-quality resin<br>• Partner with additive providers to improve quality in recyclates |
| Opportunities | • Additive comprehension (e.g., what does it do and how does it help?)<br>• Create and market products per process. (e.g., washing or extrusion) |

Source: Elaborated by the author

### 4.5.2 External interview: Masterbatch

Company C's Vice President agreed to be interviewed for this project. He has more than 20 years in the Brazilian business. Company C produces masterbatch solutions, which provide either functionality or color to the plastic material. The Masterbatch industry is positioned on a strategic point in the value chain, supplying to Converter, Recycler, Brand Owner, and demanding from Additive. His knowledge of the plastic additives domestic market and the industries it serves enriched the material gathered so far. He is a Material engineer specializing in polymers; he supervises the production line for the company.

He began his career in the recycling market in the 1990s. He mentioned that the automobile industry drove this market. Since this industry requires high aggregate value plastic, the engineering behind the process and reprocess of the material should contain additives, e.g., antioxidants, to avoid mechanical properties loss. Besides, the masterbatch do mechanical recycling with the factory process waste, allowing them to reduce costs with the reincorporation of the material. On the other value chain side, they also offer mechanical recycling solutions, post-industrial solutions and PCR.

Recycling for Company C was born with interest in the automobile industry, however general recycling solutions were always part of the company's goals. "Logically, this is being shaped now",

with the market experience and willingness to create more recycling solutions. Two return expectations are coming from the market: an image, with interest from Brand Owners in keeping ambitious public goals and propelling the market, and an economic interest, to make recycling cheaper. An image is fast to perceive, but recycling is not necessarily easy on the wallet. The supply chain involving collection, separation, washing, process, package, and return to additive process increases its costs.

Collection and separation are complicated for two main reasons: the country's waste management and technology availability. The key is to understand the applicability of the material after collection. Depending on the Converter process, the applicability might have a downgrade and requires different quality rates for recyclates or even more prime layers. For example, packages made by blowing processes can have three layers: first, the internal layer, which may have contact with food composed with prime materials. Second, the middle layer, made eventually with recycled content. Lastly, the third layer is external and might come with prime materials. Therefore, the demand is different based on which process the Converter has, and to each, a diverse range of additives. In between quoted markets, the complexities of the Agro business, cables, and electronics are mentioned as examples of the variability towards recyclate incorporation and solutions.

He mentioned two possibilities when asked about the converter's role in the value chain and how the business is done alongside brand owners. Either the solution is offered directly to the converter, or if this approach requires more bargaining power from brand owners, this last one pulls the converter production in this direction. An example, in this previous case, is the color defined by the brand owner's marketing. Inside Company C, teams are defined to attend to each brand since the colors are unique and processed multiple times – there are more than 10 thousand pigmentations available in the portfolio. Another team manages the converter side, but these teams communicate through internal marketing for product development purposes. This structure answers both sides: the acceptance of the brand owner regarding color and the processing on the converter since the color might have alterations that need to be validated again.

An example of a critical situation involving the recyclability process is when compatibilizers are needed. This additive is capable of maintaining mechanical properties and avoiding delamination. Since such a product is required in the plastic composition, it was requested to produce in the chemical industry. To find solutions, as in this case example, he said it is essential to keep close contact with his suppliers, additive providers. Two points he mentioned were the importance of testing in both companies' laboratories, as well as paying attention to regulatory measures over which product is allowed to compose the package. Since Company C attends external market and supplies composition for flexible and rigid packaging, each has its allowance limit. To control the process, product management, a team inside marketing, is responsible. The connection this company has with its suppliers is strong and its solutions need agility. Each month, they develop more than 50 new colors; therefore, formulations occur fast, especially with more players acting in this market.

The “working with partners” section of questions involves showing the plastic value chain as a linear flow and asking if the interviewee agrees to that image. With this interview, he says it is not necessarily consistent with what is happening in the market. Recycling is divided between post-consumer and post-industrial, as aforementioned.

He states that the beginning of the value chain, Resin industry, and Masterbatch “take care of their own problem” when it concerns post-industrial recyclates. Usually, they have the know-how or have business partners to recycle. The industrial waste is between 3 to 5% and needs to go through the additive process again due to thermic degradation. After this, industrial waste is reincorporated in production. On the other hand, he believes post-consuming recycling will be developed and will have high prospects but has not yet attended the market.

The most complex tasks Company C manages within mechanical recycling solutions involve color. They can only utilize PCR on white or natural color for decoloration reasons. Another reason for the white need is a certainty that PCR will not contain heavy metal in the composition, something

that is still allowed for a few plastics pigments in Brazil. Melt flow index joins the complexity combo because their prerequisite is a high index, and the market majority supplies low ones.

With knowledge and experience, it is easy to have access to supplier and test solutions. With more than two thousand clients, the technology can be validated on the demand side. Company C has a platform of problems and solutions that they attach to each client, and accordingly, improvements can be generated. Additionally, communication is made through e-learning, social media, webinars, fairs, conventions and newsletters. This way, the market is aware of needs and challenges regarding supply and demand.

In the end, the interviewee was open to sharing his experience with Company X, as well as what he thinks should be X's role in the recycling market. He replies that in this market, players should "have the solution in an economic context". There is confusion and a lack of knowledge between biodegradable, compostable, the provenience, production and process characteristics from each solution. Hence a few players need to assume the responsibility of explaining what they will supply ahead in the value chain. To communicate, those players can pursue either a sustainability dialogue or cost dialogue directly to Brand Owners. His position stands on teaching this industry, so the implementation process will move the value chain faster. The main findings for this interview are gathered in Table 4.

Table 4. Interview main findings - Masterbatch producer

| | |
|---|---|
| General Information | • Involved in the recycling market since 1990<br>• Supply other recyclers with additives<br>• Recycle its internal waste (post-industrial recyclate) |
| Pain Points and Challenges | • Additive allowance limit (each region has its particularities)<br>• Market challenges: comprehension of additives; usability for PCR; the need for testing solutions<br>• In-house they only work with white PCR or natural color to avoid contamination |
| How they work | • Close contact with suppliers |

| | |
|---|---|
| | • Keep track of clients problems (database)<br>• Product management and marketing track external factors |
| Working with Partners | • They supply resin producers and converters with additives for recycling<br>• Accessible communication and collaboration upstream for testing (“validation partners”)<br>• New technologies match problems in their database |
| Opportunities | • Teach the market the best polymer-additive fit<br>• Define to each industry which recyclate can/should be used<br>• Dialogue with brand owners so they pull correct recyclate demand |

Source: Elaborated by the author

### 4.5.3 External interview: Distributor

The distributor company interviewed is a close partner of Company X. With an efficient logistic system, they have been delivering additives solutions for Converters and Recyclers since 2008. The owner was a former Company X employee and was responsible for bringing the plastic additive’s portfolio to Brazil. His company’s value proposition is based on technical quality, range of distribution and commercial techniques.

Mechanical recycling now has a more considerable range of the portfolio for Company X’s distributors. When asked about his market challenges in this area, he said the market expects high quality but doesn’t want to pay for it. “There is a concept that recyclate should be cheaper than virgin material. This concept is wrong”. He is immersed in recycling facilities and mentioned the difficulty in stabilizing the quality of every process, which is different from each batch of granulates.

Besides the difficulty in process stabilization, the interview with Company C reveals other polymerization steps of recycled content, increasing its value. For example, a few facilities mix different types of plastic, e.g., rigid and flexible, that completely change the granulation's quality range. Due to the Corona crisis in 2020, however, the resin's price increased, as did the demand for high-quality resin. Thus, this was a window of opportunity for recyclers to improve their processes and increase the supply of recycled resin.

Their main clients are recyclers who are capable of transforming the granulate into resin. However, they mostly don't know the content's origin or which process step their solutions will incorporate. In this specific example, they might know answers for A, B, and C processes situations, but acquiring all additives at once within Company X is a challenge and might take longer. Hence, the distributor aims one problem at a time, but it loses its logistic capacity and market sales opportunity. Therefore, the logical solution is to expose the additive's capabilities to the distributor and enable ways to work through different processes challenges.

The relationship for testing and acquiring Company X's additives is defined as essential for the business. "It is not possible to be doing this alone", he mentioned. Since the additives will be directed to attend recyclers necessity, he councils the company to implement every recycling solution into one single platform. This marketing will be felt on the demand side and increase product search for a set of solutions instead of a single one.

Since the distributor position is between chemical producers and the rest of the value chain, they hold an interesting view of the main characters. From their perspective, converters have the role of pulling the use of recycled content and the Brand Owner's acceptance. "If they don't have the willingness to incorporate recycled content, nobody downstream will buy it". On Masterbatch's side, he claimed they have no interest in acquiring the material. "He will only accept if it has the mechanical proprieties that attend their requirement and if it is cheaper". Resin producers will move in the recycling direction, starting by mixing recycled and virgin. And, finally, Brand Owners can at least define a percentage of recycled content they will acquire into their packaging.

When asked about Company X's role as a plastic additives provider could play in this market, he mentioned this position is clear for the company but lacks information sharing. While they agree

on the portfolio's quality, they need to be up-to-date on the technical side of changes and the performance of additives. When the distributor is at a sales meeting in contact with a specialized team, he needs to be able to have a technical conversation. If this is not possible out of lack of content, testing, and analysis, the conversation turns to pricing, which Company X can't win in the Brazilian market. Company X's value proposition is in product differentiation and not price. Finally, table 5 comprises the findings for this interview.

Table 5. Interview main findings - Distributor

| | |
|---|---|
| General Information | • More than 15 years in the PA market<br>• Former Company X employee in a technical field<br>• Bring PA portfolio to improve mechanical proprieties of the recyclate |
| Pain Points and Challenges | • Price versus quality of recyclate: the market has to accept costs if they want to work with PCR<br>• Share information is problematic with larger players<br>• Quality guarantee of the recyclate depends on the granulation phase |
| How they work | • Improved logistics attending recyclers and converters<br>• Define the additive formulation for each player<br>• Try to solve every step of recyclability alongside the partner |
| Working with Partners | • Testing products with X<br>• Associate with converters to pull demand<br>• Assist recyclers with waste stream quality |
| Opportunities | • Show the market qualifications of additives<br>• Provide better and more abundant content and performance tests<br>• Enable its distributors |

Source: elaborated by the author

### 4.5.4 External interview: Converter Industry – Management and Technical

In this section, both interviews will be united for confidentiality and simplification reasons. Both subjects have more than 15 years in the processing industry segment, working with recycled resin. A sustainability approach was recognized as part of the organization's strategy. With a high capacity of consuming PCR and post-industrial resin, this player gave multiple examples of why and how organizations are turning to a circular economy. From economic history to health and climate, the interviewee traced the production of plastic life back to the 19$^{th}$ century as a replacement for heavier materials. As plastic consumption grew, so did the technology in several sectors, including health care, facilitating an increase in life expectancy. Such an increase raised the awareness for a cleaner world and cared for natural resources.

The converter considers collection and sorting to be their primary challenges, just like resin producers. The converter in this study works with PET, and for this polymer, the collection rates are higher. Even so, the investment rate is low due to a lack of raw materials. To invest in a new processing plant, they analyze the waste's supply chain capacity and origin. The process must be easily auditable; hence, they work with formal suppliers who can promise guaranteed quality.

For a partnership to be successful, trust among suppliers and customers is crucial. Support in testing for additives is made through the extended contact they have with Company X. Once again, another industry joins the help towards collection in sorting in the country through investments and training. The training teaches cooperatives how to collect efficiently (logistic training), separate per polymer and coloration.

The role of public politics and regulations for this player is decisive towards EPR, for example, bottle bills, through taxes, and improvement of waste management. A challenge here is the country's regionality complexity: the five Brazilian regions have their particularities over waste management; the rules are not the same for all regions. The primary considerations are available ahead in table 6.

Finally, when asked the role of PA in their processes, the interviewee replied that “the role of this company is of communicating”. From the technology perspective for additives, the processor is proactive in using all products and services available. The opinion is that the organization [Company X] can unite the market and bring important stakeholders to share opportunities and developments. “We would like to make decisions based on information” – he added. Life-cycle assessment, data, and solution impact calculation are examples of what the company should be doing with partners. “Circular economy is for us something we well understand how it is supposed to work, but a lot of people doesn’t see the same way”.

Table 6. Interview main findings – Converter

| | |
|---|---|
| General Information | • More than 15 years in processing recycled content<br>• Sustainability as risk assessment: social, environment and governance<br>• Transparency over origins of the recyclate |
| Pain Points and Challenges | • Collection: capacitation of suppliers<br>• Sorting: capacitation of suppliers<br>• Factory infrastructure must be constructed closed to waste opportunities<br>• Type of machinery compatible with additives provided |
| How they work | • Involvement of clients, suppliers, associations, and government<br>• Try to transform recyclate usage into large scale<br>• Development of technologies and public regulations towards a circular economy (transition support) |
| Working with Partners | • Partnership with the collection and sorting organizations (strong dependence)<br>• Regional regulators<br>• Plastic Additives for products and services |

| | |
|---|---|
| Opportunities | • Communication and knowledge regarding products that can increase the circularity of products<br>• Support in the product life-cycle |

Source: Elaborated by the author

### 4.5.5 External interview: Brand Owner – Sustainability in Packaging

This interviewee was approached for his position at the organization and the brand's public commitment over sustainability. He was of great value for this study. With almost ten years in the cosmetic sector and experience regarding recyclable content, mechanical recycling for plastics is crucial to his position. His department is part of Research and Development and has a role in pursuing packaging components and process development.

The top three challenges the company faces are related to regulations, regionality, and supply chain. Regulatory measures become a problem when each country has differences in guidelines for each polymer type. For example, Brazil and Colombia do not recycle the same way, nor with the same materials, which creates a commercial impact. The composition of the recyclate stays at each federation to decide its guidelines. This situation pulls the second challenge, a regionality difference that impacts the third, supply chain. Here, for example, a market problem surges if a cooperative stops collecting the package due to disadvantages of the material.

A selected team must resolve challenges that impact one another. For example, a project is created with a new production line involving partners, such as converters and polymer producers. In such projects, the Environment and Regulatory departments must together trace the market and establish a strategy. The obstacle behind sustainability for those departments is to achieve a balance between a lower carbon footprint, recyclability, and less raw material usage altogether. Creating a line entirely focused on recyclability is not possible because it affects carbon impact, for example. In the end, the brand owner must decide the level for each parameter that best fits its sustainability goals.

Physical and chemical components are evaluated in the design phase of packaging composition. The percentage of recyclate a package can absorb depends on converter tests, but the brand owner tries to keep it maximum (e.g., 40%). When the test fails, the converter decides which partner can provide additives to solve the situation. Therefore, the role of PA for this player is behind the chemical knowledge it can provide. Since the partnership with converters is vital and collaborative, PA assists the entire project, not just one player.

Table 7. Interview main findings – Coordinator Sustainability in Packaging

| | |
|---|---|
| General Information | • Environmental Engineer, with almost ten years of market experience in packaging<br>• A cosmetic industry with public sustainability goals that include carbon footprint mapping, raw material usage control, high corporate social responsibility, and recycling |
| Pain Points and Challenges | • Maintain all sustainability goals without jeopardizing each other's metrics<br>• Enable cooperatives in the proper collection of packaging<br>• Guarantee high rates of recyclate in packaging composition – high dependence of converter ability |
| How they work | • Internal organization with sustainability focus departments (ecological packaging, technical solutions for packaging, sustainability, and environment)<br>• The compliance department can stop the process if the resin has an unknown source |
| Working with Partners | • The company interacts with Polymer producers and converters first<br>• Regarding recyclability, partner with cooperatives and recyclers to increase reverse logistics |

| | |
|---|---|
| | • Share the project risks with partners |
| Opportunities | • PA inserted in the converter processing and assist recyclate issues<br>• Chemical knowledge provider for the three players involved (brand owner, polymer producer and converter) |

Source: Elaborated by the author

### 4.5.6 External interview: Brand Owner - Package Designer

The interviewee works in the packaging industry and has proper knowledge about a sector less explored by the PA's department. She is a researcher for the Innovation Center of Fundação Getúlio Vargas (FGV) – Hub INCRÍVEIS, with experience in packaging development in the food industry. She gained experience with companies such as Nestlé and BRF. Within the B2B market, she acted in the Packaging Industry, defining and working on strategic business projects leading commercial and technical teams. She also serves as a consultant for the packaging segment and consumer goods providing market analysis. She is an autonomous agent, therefore her questions were adapted to her experience, not focused on one company per se

According to her, as a packaging designer, the first development challenge is to define the package's purpose based on the type of product. The package will either be disposed of at a landfill or collected and sorted. It doesn't make sense to recycle coffee capsule packaging, for example, because the capsules are very small and in direct contact with food content, making the washing and collection difficult. This would most likely contaminate the recycled content at the end of the process, and it is too small and costly to be selected. This is an opportunity for biodegradable packaging, which is lightweight, small and has a slight degradation period compared to other packages. The development, therefore, works with the concept behind the package, which is the product's application.

The development discussion should start before the package conception, with the polymer producer. When the product is intimately connected with the package, as in the coffee capsules example, the polymer type is deeper involved alongside plastic additives to promote a

biodegradable solution since collecting this material is impracticable. Hence, the product determines the package's function and, consequently, composition. The polymer producer controls the volume produced, therefore they have the responsibility of communicating with the whole value chain, especially brand owners.

She believes that brand owners have the job of studying the market, acting both upstream and downstream. The brand owner specifies the packaging purpose by defining weight, the length of time it should support the product, volume, light precautions, and oxygenation. Within these parameters, they send their specifications to the converter industry, transferring the challenge to the next player. The converter might add different layers, mix another range of additives such as compatibilizers and light stabilizers, and increase the content's complexity when it is collected to recycle in order to attend to the brand owner's specifications.

She brought up the fact that the converter has the lowest bargaining power compared to the rest of the value chain. Therefore, it could be the biggest challenge and opportunity for Company X to address: adapting itself for a new fragmented market, providing knowledge and new services, and a chance to innovate and close the plastic cycle at a different spot.

When asked about her vision of the plastic value chain, she mentioned the need for a secure and trustworthy collection and sorting since the business in Brazil is primarily informal. She noted the social variety in this value chain stage and mentioned that every investment any industry will do relates to the amount of recycled content they can get. Therefore, the main problem for brand owners is to develop a business to acquire recyclate with a mostly informal collection and sorting stage. This creates an unstable supply to the whole chain and their oriented approach is to increase collection security.

She mentioned that some brand owners map their recycling goals, such as AMBEV. The surge of blockchain technology is also something that the packaging group and brand owners should be aware of when they are trying to solve collection and tracking challenges. Dow and Boomera were

also mentioned as good practice examples. All the models and names given touch one point: the amount of research and investment in startups with technology to map the recycling market, such as blockchain. “With research in hand, companies have something to offer or trade, diminish risk, and provide better future provisions. If you can do simulations of the products you want to offer, your value increases immensely”. Her point is to bring results and show the market the additive value.

When the questions were directed to sustainability in packaging and which departments were involved, the brand owner’s anatomy pictured included Supply Chain, Innovation and Research and Development. The sustainability department is growing, but it is also composed of people from those three areas. It will be composed of employees whose activities will range from reverse logistics, material acquisition, and network relationships.

The interviewee stated that Company X should be visiting all value chain players and strategically bring information to those without resources. She believes that it is important to engage with the weak links of the value chain in order to guarantee their survival. Initiatives for engagement and action regarding communication between players should be Company X’s role. Promoting workshops, meetings and opening up discussions are primary values that Company X can provide.

Table 8. Interview main findings – Package Designer

| | |
|---|---|
| General Information | • More than 20 years working with packaging<br>• Strong experience in packaging for food applications<br>• Packaging consultant for industries and package organizations |
| Pain Points and Challenges | • Converters: receive the challenge of utilizing recyclate without compromising the content’s safety<br>• Understand the packaging’s polymer and additives per product/utilization |
| How they work | • Specifies the packaging purpose by defining weight, product’s utilization time, volume, light precautions, and oxygenation (R&D and Supply Chain involved) |

| | |
|---|---|
| | • Specifies recyclate utilization parameters (percentage) |
| Working with Partners | • Main partners are organizations from the public and private sphere<br>• Startups, blockchain technologies, product life-cycle trace<br>• Converters are responsible for finding the right package proprieties |
| Opportunities | • Provide analysis, studies, and tests that prove material efficacy<br>• Unite the value chain through a standard process and unique speech |

Source: Elaborated by the author

### 4.5.7 External interview: Recycler Management

This interviewee has been a professional in the plastic industry for more than 18 years and has a lot of value to offer. He is a man with a career as a materials engineer specializing in oilfield and gas and an MBA in Business at FGV. By the time he was doing his MBA, he was already in the recycling industry. The business has three sectors: buying and selling pellets, washing and granulating plastics, and reverse logistics.

There is an internal focus for acting in this business: both partners who manage the company have a background in chemical engineering. This “unquietness” they have, quoting his own words, came from proving the plastic can and should be reutilized. The material itself is not the villain but the misuse and incorrect disposal of it. In Bahia, the northeast of Brazil, he mentioned how recycling was focused on paper and aluminum, forgetting the biggest polluter, plastic.

Therefore his motivation was to prove that this material could be managed. Still, the country faces a few challenges: technology, social and political management and communication between

industries. On the technology side, he believes there should be strong collaboration between large enterprises and small/medium recyclers. He commented that working alongside a Petrochemical organization such as Company X was rough but allowed him to improve in know-how because the corporation demanded it.

There is a lack of collaboration between recyclers, but the communication between polymer producers and recyclers is increasing. The polymer producers can provide training and capacitation to recyclers. Recycling, unfortunately, is still a shy industry made mostly by small companies with difficulties in reaching multi-organizations. Therefore, when communicative and business approaches are made by polymer producers, the whole chain benefits from it.

Recent challenges included recyclate blending with virgin material, which requires technical support from additive providers. Multilayer packaging needs compatibilizers; otherwise, it finishes in landfills or incineration. An excellent example of a multilayer package is animal food: it can’t have odor or attract animals. The multi composition makes the recyclability of the material almost impossible.

It was not an easy task to find industries capable of developing technologies in recycling solutions. The interviewee mentioned that he searched in universities for collaboration without success. He then pursued to engage with organizations since academia couldn’t provide the technical expertise he required. He also mentioned the difficulty in finding good technical studies at the material property level, so he tried to collaborate with the academic field. Finally, an advertisement effort regarding presence in fairs and webinars brought the recycler the organization's attention he needed.

Since recycling is a small business, few people coordinate, and with this flexibility, it is easy to be hands-on. One person in management can engage production, coordinate marketing efforts and connect the market. The interviewee acquired business knowledge and experience and was active in events, establishing connections alongside his business partner. As a former employee from Braskem, the relationship created a channel for business.

The way recycler works is not easy. It is clear that the technical capability they need to align with corporations' expectations requires effort. But this specific recycler has the culture and background for pursuing solutions, regardless of size. He created his business to be capable of research and development; he believes this department will be boosted inside recyclers in the future. He thinks that waste reception will be developed in the chain, through either good waste management or cooperatives with efficient collection and sorting. This will benefit the recyclers.

When the researcher presented the pre-conceived value chain to him, his first reaction was to comment that the chain "is not so linear". The participation of additives is also downstream; collection and sorting can also be close to the Brand Owners and consumer goods industry. Recyclers are supplied from the last two quoted sectors, as well as from Retail.

The interviewee next goal is to further engage the packaging industry. The clients have come organically, without much marketing effort, and this industry is gaining attention. But, he sees himself looking for clients in the future, not only in Brazil but also for representatives inside other companies, such as petrochemicals, to gain space in the market.

Good experiences came from partnerships with other companies: he believes the enterprise passes a good image and an excellent job to their partners. The technology domain that comes with their partners is interesting for the business. One example was with the film provider: they reported the in-house film waste for the partner with data about losses and recovery opportunities. This report proved this waste could return to the production line through reverse logistics, avoiding higher costs and becoming a new film with raw material. With this partner, they engage in the film business and reprocess the material with the appropriate quality.

When approaching the multilayer problem, he believes this is to be changed upstream in the value chain by reducing it, creating more mono-material plastics. Meaning, large-scale industries should tackle this situation, and at least make compatibilizers to help the process downstream. When the material is compatibilized it can be used for civil construction – bridges, roads, hydroelectric dams

– not necessarily only in packaging. In his words, “if you have a good structure in the plastic value chain, we don’t need landfills or incineration”.

When he was asked about the role Company X could play in this market, he mentioned the organization's different market permeability compared to polymer producers: agriculture, construction business, and automobile are target examples; they are three big industries that already incorporate recyclable material and benefit from additives, hence the connection. Regarding additives, he believes Company X should work closely with Masterbatch in Brazil because of the country’s difficulty in using this technology. Company X can provide integration between them because they are immersed in diverse sectors that do not communicate.

Table 9. Interview main findings - Recycler

| | |
|---|---|
| General Information | • Material engineer with more than 18 years in the plastic business<br>• Recycler owner specialized in reverse logistics |
| Pain Points and Challenges | • The technology available for the recycling process and public waste management<br>• Blending virgin polymer with recyclate |
| How they work | • Increase R&D capacity<br>• Search partner players actively<br>• Proactively provide researches to acquire projects |
| Working with Partners | • Actively in the packaging industry, provide recyclate compatible with the partner’s requirement<br>• Partner with Petrochemicals<br>• Collect and reprocess films from post-industrial |
| Opportunities | • Industries integration through collaboration and efficient communication<br>• Technology support relative to machinery, recyclate composition, and testing |

Source: Elaborated by the author

# 5 DIGITAL IMPLEMENTATION

This chapter covers the digital marketing strategy based on the result of the interviews. The efforts to achieve the whole plastic value chain, its challenges, and opportunities presented earlier confirm knowledge and communication as central values. Hence, the website content must always be directed to a contact page, a possibility of interaction, product value proposition, and processes.

Therefore, the content creation will care for where and what is disposed at the website main pages. There are three main messages in the acquisition phase: “we want to address recyclability issues”, “this is what we are doing”, “here you can find more about our products”. The storyline in a journey is crucial to involve the persona’s actions, hence the titles.

Finally, mapping the journey, make it possible to identify the lead creation steps. Those are the moments where the persona willingly gives its contact through requests. The interviews pointed to the necessity of information sharing, technical material, and facilitating communication. Nevertheless, the journey is mapped to simplify each request and acquire the customer and lead information.

## 5.1 Digital marketing strategy

The whole project involves market analysis, capturing industries challenges and needs, and possible opportunities for PA to pursue. The interviews gathered in section 4.5 aimed to help identify market trends and address a digital customer journey. Since the transformation takes the lead in marketing and business development inside the organization, stakeholders were interviewed and internal data, specifically from technical sales and new product development, was analyzed. Every step necessary to implement this journey, as well as all marketing/sales tools were taught to internal stakeholders.

Three phases are crucial to implementing the strategy: the acquisition, nutrition, and action (or contact) phases. The first aims to attract the personas through main pages such as press releases, landing pages, and blog content. The second, the nutrition phase, will count on the marketing

automation, Marketing Cloud, to nurture the lead after a request is made through the exemplified pages. Third and last, the sales action, guiding the customer to a representative of PA.

Customers will be prioritized in accordance with their impact on the business, with scores from “cold” to “warm” leads. Based on the scoring, marketing will be quicker to direct content and open communication. There are at least three lead updates through any journey path to increase the score. It is the chosen way to limit which contacts will be attended by sales.

### 5.2 Content creation

Content’s importance for marketing was sustained in the literature and the significance of its presence was proven by the interviews. In addition, information and knowledge sharing, collaboration and support were constantly appearing as a market need. The customer journey exemplified ahead will guide the buyer persona towards all relevant material and eventually, the buying action. Three main pages are created for the acquisition phase: press release, landing page, and industry page.

A press release has the purpose of attracting a persona to the landing page. It will address the new, global portfolio for mechanical recycling. It will be structured to attract the persona to the Plastic Additives landing page. When the buyer persona is interested in immediate contact, all channels adopt the same contact form, providing consistency.

The persona interested in a specific product must also have technical and marketing material available for download, as well as a “request product sample”. The necessary communication and knowledge will be represented through webinars, brochure downloads, request contact, or a product sample.

### 5.3 Marketing automation tool

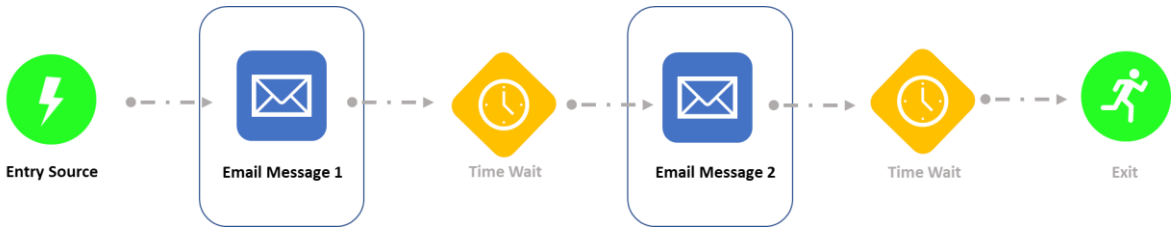
The tool utilized was Salesforce Marketing Cloud, a powerful marketing automation platform. It can create cloud pages on a simple low-code structure, as well as emails with customized templates

(SALESFORCE, 2021). In addition, a content builder creator is available for a standard form creation of emails and newsletters, for example. All solutions are integrated with cloud pages and email campaigns.

Another remarkable feature of this tool is that it is able to segment the audience, creating user leads according to each campaign and personalizing content. Tests A/B are an effective split method to understand each promotion pattern and are also available in the platform. After a campaign is live, the platform allocates all data to be viewed on a single source, Datorama.

Finally, the features described can be utilized at Journey Builder in Automation Studio. Journey Builder allows the user to automize the campaign and create leads. Figure 9 represents an example of an automated mailing campaign, beginning with an entry source, two pre-designed emails and an exit.

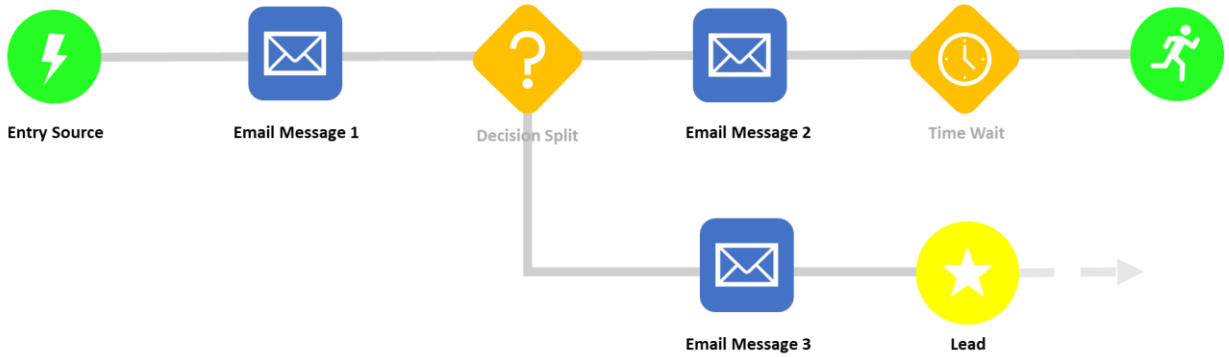
Figure 9. Journey Builder automated campaign structure




Source: Adapted from Trailhead – Salesforce Marketing Cloud

The figure represents a simple journey for a lead to receive two automated emails and finalize it after a pre-determined time. Another possibility is illustrated in figure 10, with a decision split based on customer engagement. For example, if the receiver opens “Email Message 1”, they will receive an “Email Message 3” and the lead status will update.

Figure 10. Automated journey example with decision split



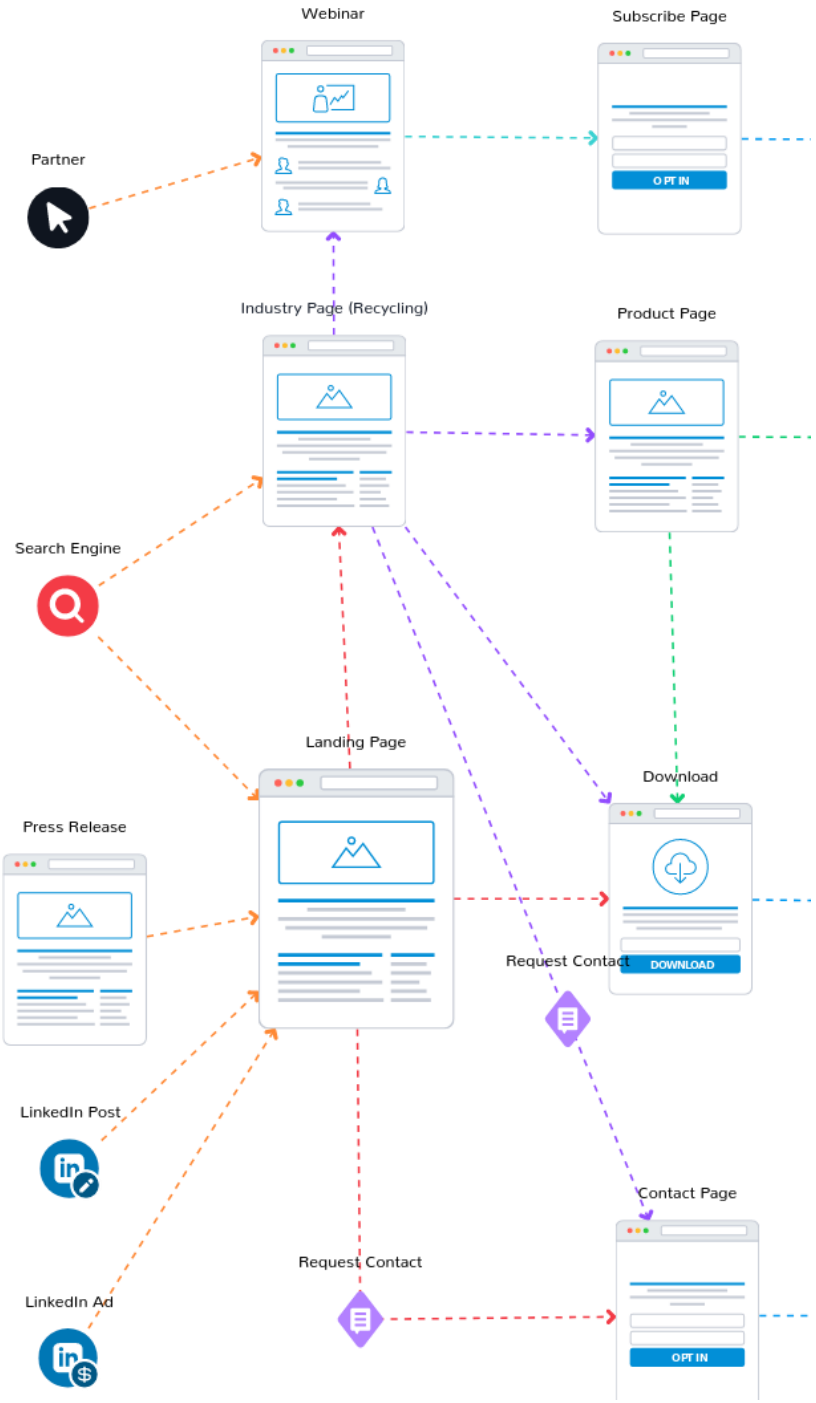

Source: Adapted from Trailhead – Salesforce Marketing Cloud

The examples given in Figures 9 and 10 raised the platform's capability of content generation and automation. However, given the importance of both items presented in the literature and internal knowledge, the concern focus on content creation.

### 5.4 Customer Journey

The journey developed maps the acquisition, nurturing, and ready-to-buy stages. The illustrations ahead were modeled with the support of the Funnelytics tool (available at app.funnelytics.io). Figure 11 illustrates the main entry points provided by the marketing team for Plastic Additives, starting with the acquisition phase. Search engines, LinkedIn, and a partner are described as sources, directing the persona to the central information: Press Release, Landing Page, Industry Page, and Webinar. A webinar results from a partnership: the partner can direct users to a webinar because they promote the event, but the content is unique to PA.

Figure 11. Acquisition phase – entry sources and main pages




Source: Elaborated by the author with Funnelytics app

In the second illustration, figure 12, the path directs the persona to a lead generation process. For example, the industry page illustrated in figure 11 has four possible directions (indicated in purple): direct the persona towards a specific product, an industry compiled download, a new webinar, or request contact. As mentioned, the persona might look for a particular product if the brand and processes are known.

When the persona is interested in discovering or comparing other solutions, the download section is able to provide compiled materials. Therefore, one path directs to onedownload in particular and another to a product family download group (represented uniquely as “Download”). Both downloads will generate the same lead. If the persona is interested in requesting a sample, then this path generates a unique lead since it represents a higher possibility of purchase in the short term.

The landing page contains all industries PA attends to, but it must direct for Mechanical Recycling when the rollout occurs. Mechanical Recycling will be displayed on the upper side of the landing page when the Press Release starts. As the main channel for PA, it gives personas technical and marketing downloads, as well as request contact.

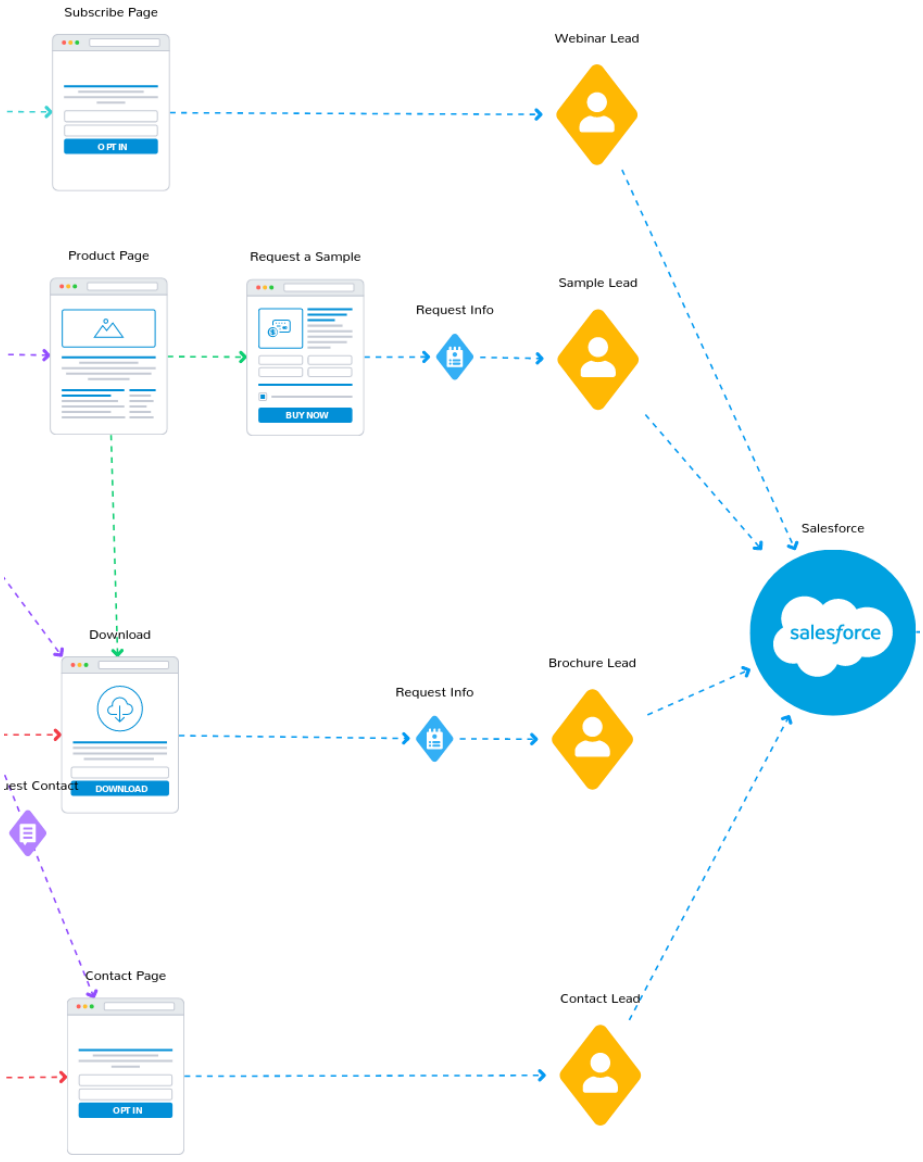
Webinars have been a successful information-sharing tool in the additive market, especially with the digital context that Covid-19 pushed. Since webinars involve an agreement with partners, a lead will be generated specifically for such partnership after subscription. The partner will publish the announcement but the persona will be directed to a Company X page.

Finally, four unique leads are represented in this diagram:

a) a Sample Lead, originated from requesting a sample and interested in **testing** the product;
b) a Brochure Lead, interested in **knowledge** over PA products;
c) a Contact Lead, requesting a **communication opening** with PA agents;
d) a Webinar Lead, interested in **information** over PA topics.

The leads will enter the nurturing phase after creation, each with a specific email campaign. Finally, the marketing automation tool will implement the journey described in figure 12.

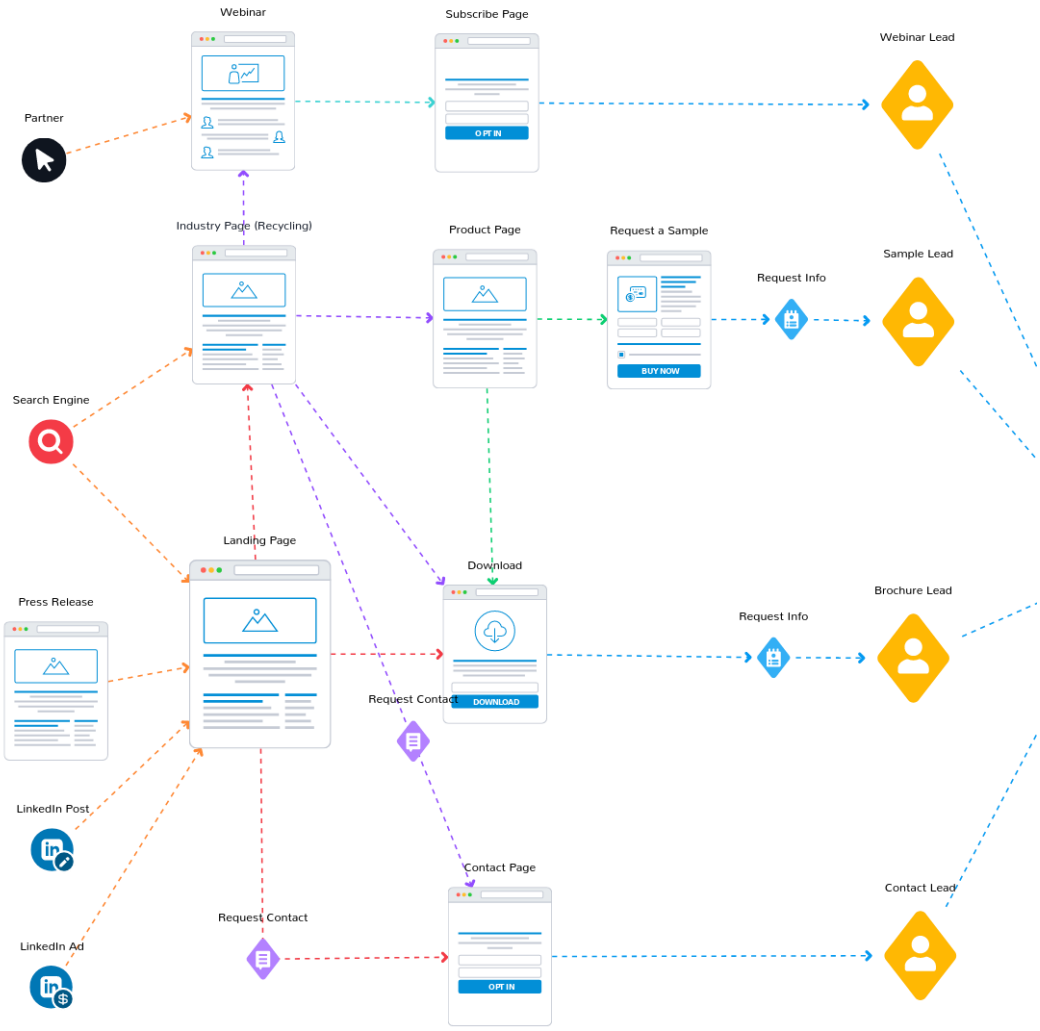
Figure 12. Acquisition phase - Lead Creation




Source: Elaborated by the author with Funnelytics app

The complete acquisition phase is then represented in figure 13. For scale and comprehension purposes, it was divided into two steps shown in Figures 11 and 12.

Figure 13. Acquisition phase - A complete view



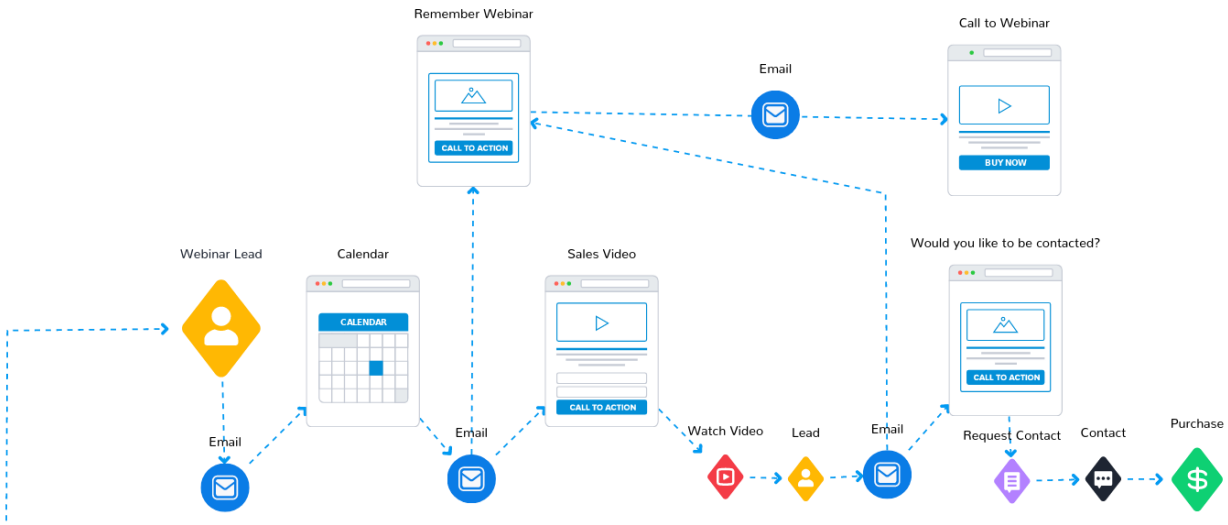

Source: Elaborated by the author with Funnelytics app

Finally, the marketing automation tool allows the user to create four different campaigns for each lead generated. Figure 14 allows complete visualization of a nurturing phase. This work will not model the nurturing phase because Marketing Cloud was not implemented until the current time. This journey will be utilized by PA when the implementation is complete. Each path represents a

possibility of completing a purchase, but it will depend on the sales contact opening (contact indicated in black).

Finally, after entering the nurturing phase, each lead will have its own campaign, automated through Marketing Cloud. Figure 14 illustrates the designed Webinar Lead path. In this journey, the persona will receive a calendar reminder email and it is proposed a decision split. The upper line will receive a reminder email and later a “Call to Webinar”. The second path will receive an advertisement video and test the campaign engagement. If the persona watches the video, the lead status will be updated with a later possibility of being contacted by a PA representative.

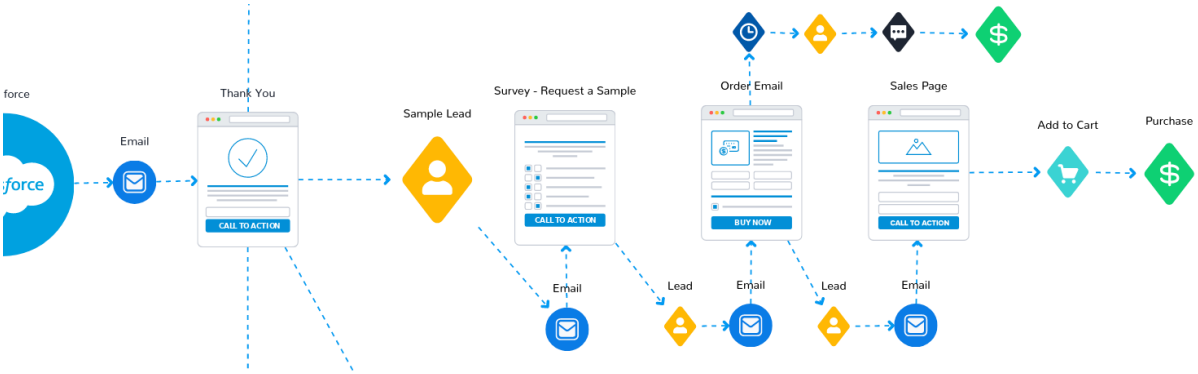
Figure 14. Webinar Lead nurturing path




Source: Elaborated by the author with Funnelytics app

The second path, Sample Lead, will be illustrated in Figure 15. To receive a sample, it is necessary to fill a survey where the customer data is validated. Out of confidentiality and competition risks, this path must be controlled. Then, the lead is updated with the survey completion, and an “Order Email” is sent. Finally, the sale can be completed through online shopping or a representative.

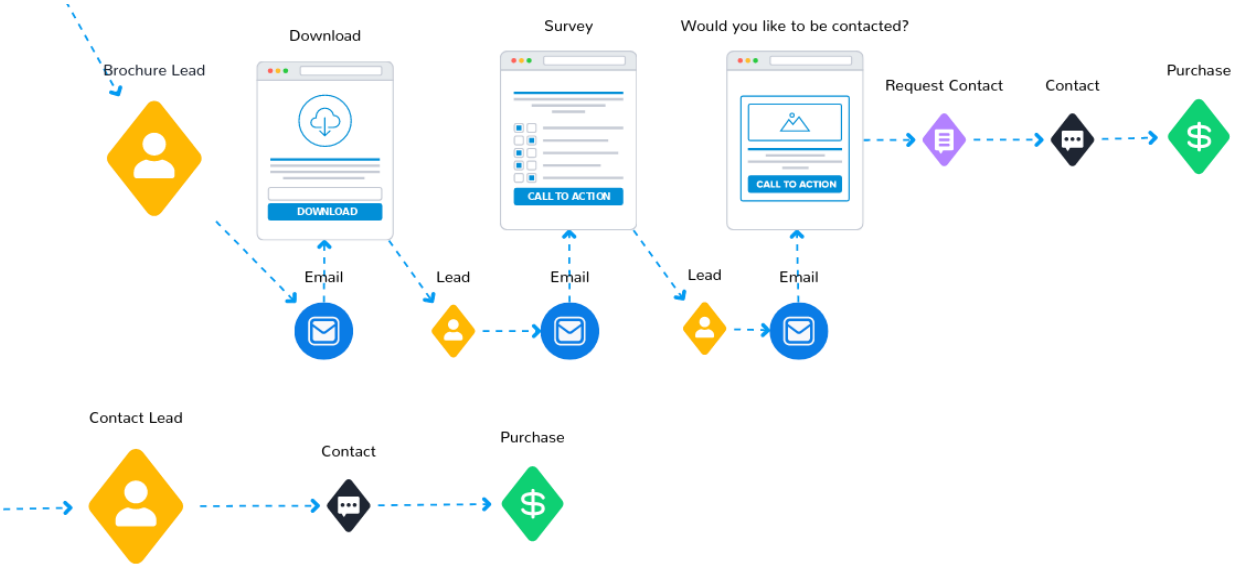
Figure 15. Sample Lead nurturing path




Source: Elaborated by the author with Funnelytics

The last two paths are illustrated together in Figure 16, Brochure Lead and Contact Lead. A brochure, after downloaded, will update the lead and generate a survey email. This survey is needed to discover what the customer might be interested in about PA material. If the survey is replied to, the lead is updated, and a follow-up email is sent. If the client does not interact with any of the emails, the lead will be deleted from the system after a defined period.

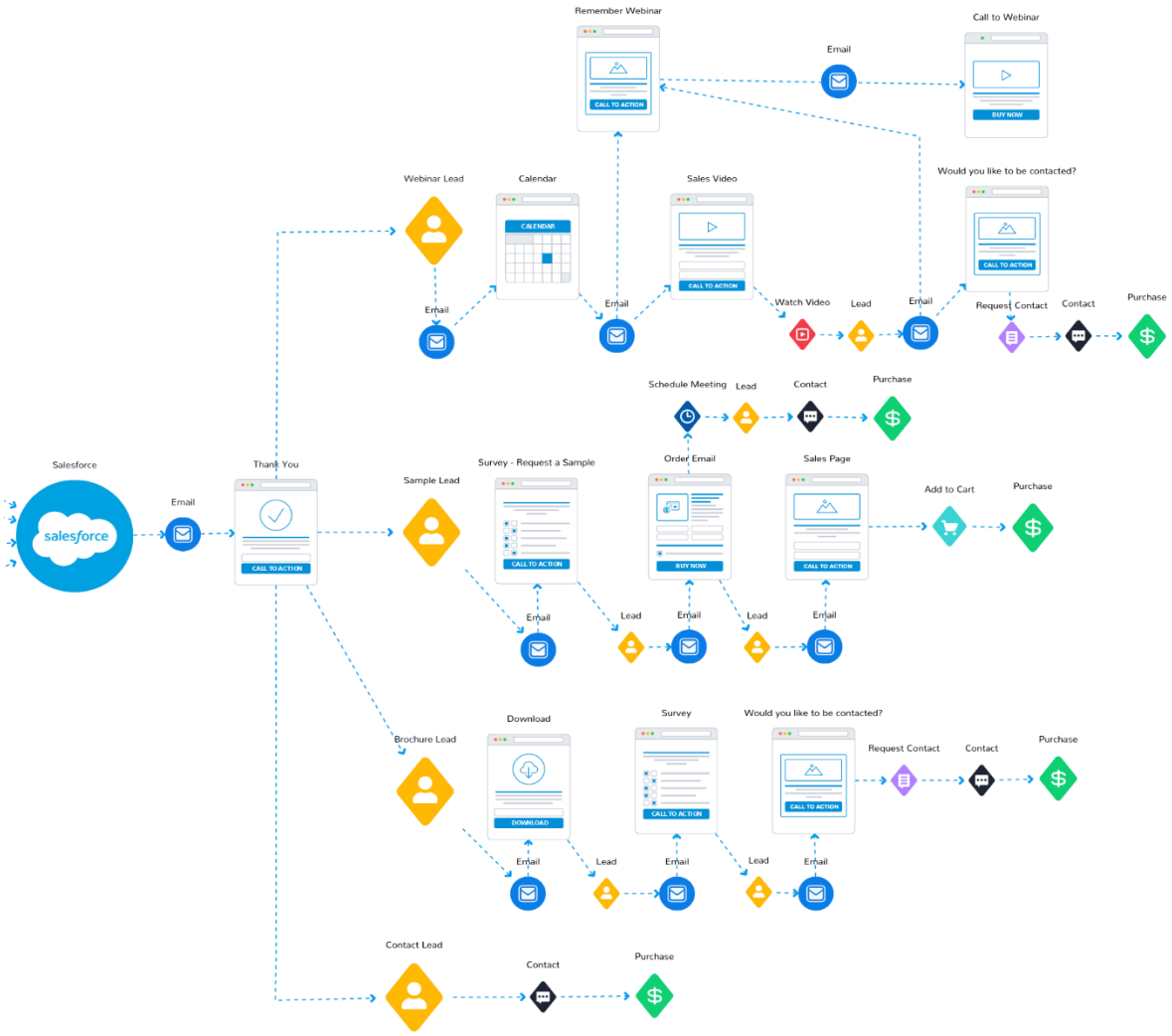
Figure 16. Brochure and Contact Leads nurturing paths




Source: Elaborated by the author with Funnelytics

All paths will represent a possibility of being contacted and therefore with a purchase goal. Figure 17 illustrates a complete view of the nurturing phase delivered to the PA department.

Figure 17. Nurturing phase – A complete view



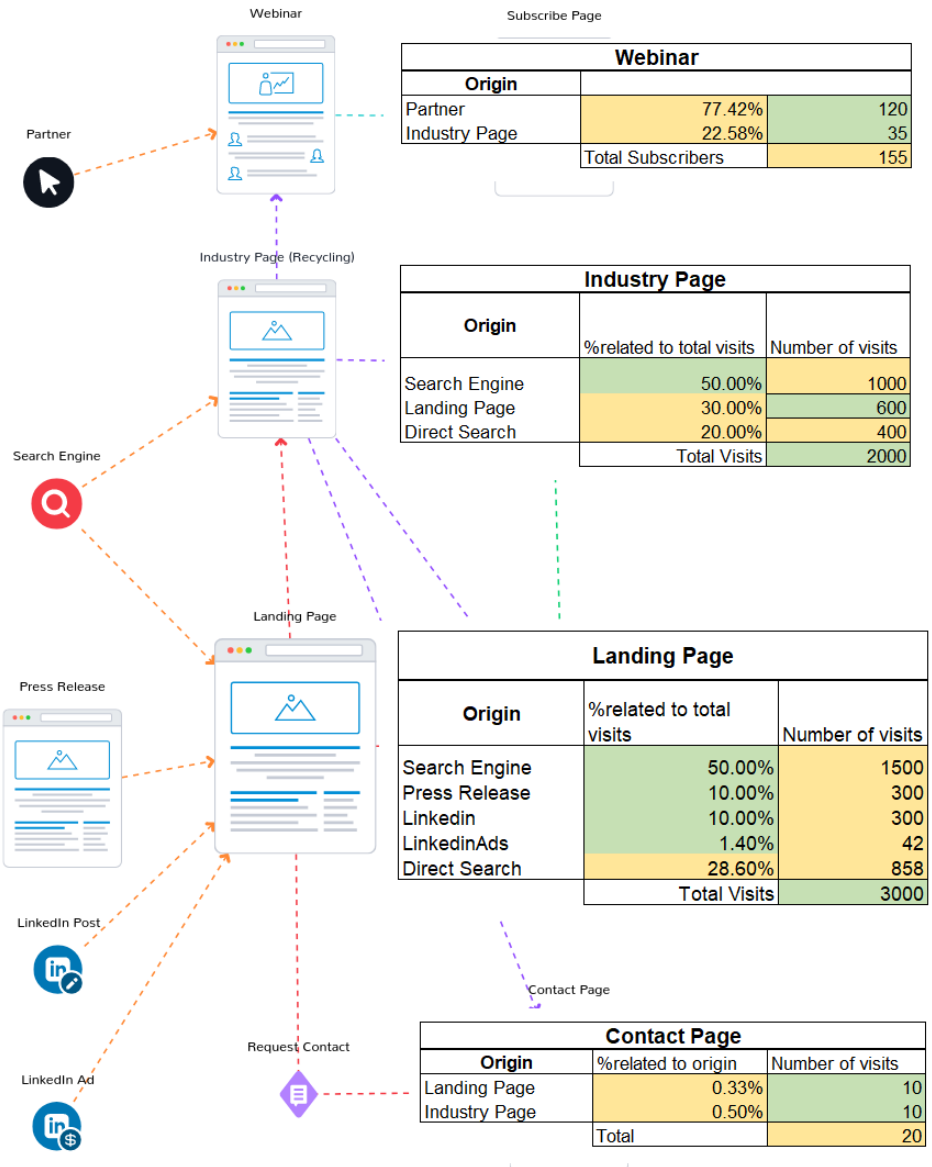

Source: Elaborated by the author with Funnelytics app

## 5.5 Scenarios and improvement possibilities

The numbers used in the simulations ahead are multiplied by a coefficient α. It was possible to show the department which pages influence the lead generation process using Excel. The reflection in leads is easily calculated, with an effort to update content and advertisements. The green cells

represent numbers the department can obtain from data analytics programs. Yellow cells are blocked for calculations. Figure 18 exhibits entries for the webinar, recycling page and landing page in a window of 30 days.

Figure 18. Entry sources and main pages




| Webinar | | |
|---|---|---|
| Origin | | |
| Partner | 77.42% | 120 |
| Industry Page | 22.58% | 35 |
| | Total Subscribers | 155 |

| Industry Page | | |
|---|---|---|
| Origin | %related to total visits | Number of visits |
| Search Engine | 50.00% | 1000 |
| Landing Page | 30.00% | 600 |
| Direct Search | 20.00% | 400 |
| | Total Visits | 2000 |

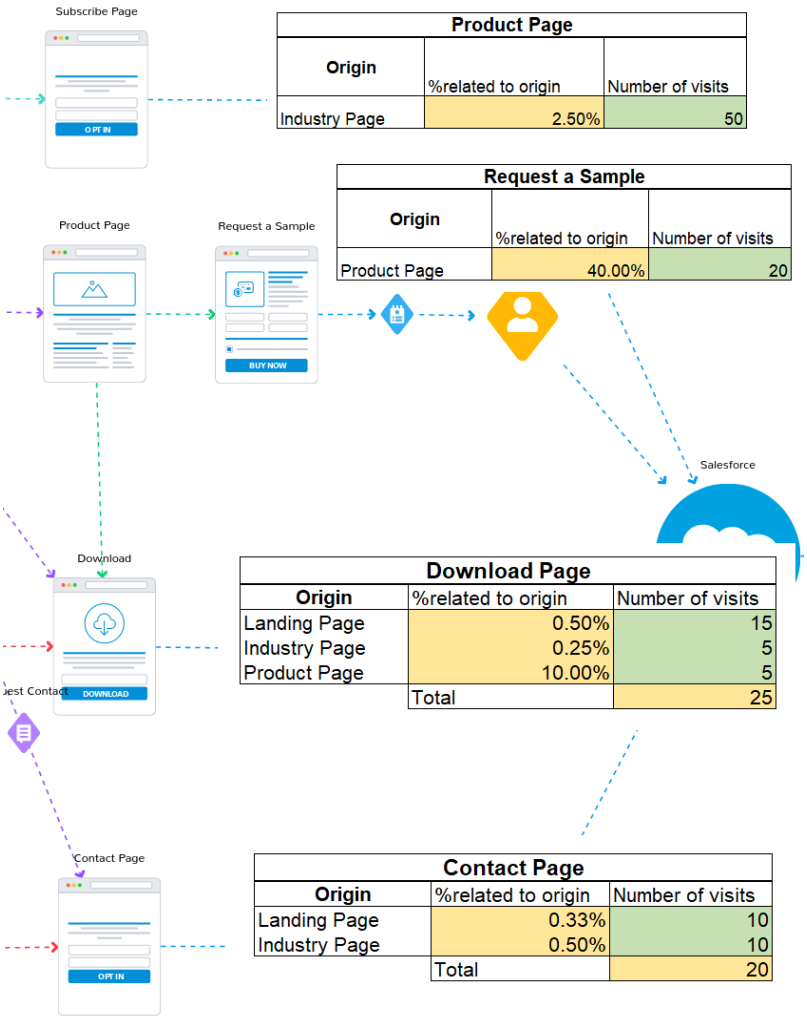
| Landing Page | | |
|---|---|---|
| Origin | %related to total visits | Number of visits |
| Search Engine | 50.00% | 1500 |
| Press Release | 10.00% | 300 |
| Linkedin | 10.00% | 300 |
| LinkedinAds | 1.40% | 42 |
| Direct Search | 28.60% | 858 |
| | Total Visits | 3000 |

| Contact Page | | |
|---|---|---|
| Origin | %related to origin | Number of visits |
| Landing Page | 0.33% | 10 |
| Industry Page | 0.50% | 10 |
| | Total | 20 |

Source: Elaborated by the author with Funnelytics and Excel

The entry data provided in the main pages illustrated in figures 18, a fraction of those visits were reflected in the subsequent pages, represented by figure 19. Again, the percentages are related in comparison to the entry sources visits. For example, out of the 50 visits in the Product Page, 20 followed through to “Request a Sample” and ordered. Therefore they are a representative of 40% of the origin page visits.

Figure 19. Acquisition phase lead generation per page




Source: Elaborated by the author with Funnelytics and Excel

Next to the primary pages, figure 19 illustrates the second step towards lead generation, with numbers multiplied by a coefficient β. The percentages are related to the flow of the page before it. So, for example, Product Page had 50 visits in the last 30 days, representing 2.5% of the Industry Page visitors. Request a Sample had 20 applicants, representing 40% of Product Page visits.

Finally, figure 18 detail the flow delivery for each lead generated. Again, the marketing manager can track the performance of the page by altering the green cells. It will give insights into which paths had a flow increase.

Figure 20. Total leads acquisition phase generation

| Total Leads Generated | |
|---|---|
| Download Page | 25 |
| Contact | 20 |
| Webinar | 155 |
| Sample | 20 |

Source: Elaborated by the author

### 5.6 Management Evaluation

The Digital Excellence team received this work and evaluated it carefully. The external interviews surprised them since the reality of waste management in Brazil is different. Based on the interview results, a customer journey that attended to the customer's needs was created and adapted accordingly to the business reality.

Another positive surprise was the awareness they want to create based on these results. On the one hand, awareness of the need to open communication with customers and actively propose fruitful discussions; on the other hand, of the impact that digital platforms have on achieving their goals. In addition, they increased their knowledge about the industries' main stakeholders and overall value chain.

Digital marketing on a B2B level must be designed towards each industry segment. The benefit of this work is the possibility of repeat the methodology steps and reconstruct the journey for another product and another persona. Therefore, this work fills the gap the B2B digital marketing has to deliver a high-value proposition on a structured path.

## 5.7 Future Steps

The digital marketing team will implement the content and nurturing journey once the Salesforce Marketing Cloud is active. In addition, the visitor's tables will be used to track the performance and success of the campaigns created. Nevertheless, this project is delivered to be utilized for other customer journeys projects as a guideline.

# 6 CONCLUSION

The steps presented in this work's methodology were taken to construct a digital customer journey for plastic additives in a mechanical recycling context. This was only possible by understanding the current Brazilian scenario involving waste and recyclability, researching the value chain, capturing customer needs, and finally drawing their connection.

These steps expose the industry bottleneck, methods to tackle the problem, and possible solutions for an additive provider. Since the assistance required in knowledge, market integration, and communication were repeatedly mentioned through interviews, the digital customer journey created was designed to focus on content and enabling contact.

The flow created allows the organization to recognize where the content should be changed in order to increase the number of leads they desire to achieve. An excel workbook was delivered as a journey mapping flow example where the user can easily update their monthly data.

The implementation of Salesforce Marketing Cloud can cause the lead generation capacity to increase. On the other hand, the customer journey flow proves that the lead generation will not increase if the acquisition phase is not efficient. Therefore, without a proper acquisition phase the investment in such a tool would be a resource waste. If content quality increases, the positive impact from a marketing automation tool will be reflected into the nurturing phase and subsequently, purchases.

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## APPENDIX A – INTERVIEW SCRIPT FOR INTERNAL STAKEHOLDERS

As the project starts from a global new strategy addressing plastics mechanical recycling, a customer journey should be proposed at the research end. This methodology was being used lately by the European team and, since Salesforce Marketing Cloud improves and automates designed journeys, this questionnaire is made to assess the marketing tools' usabilities. The differences and similarities between those two regions were something this research intended to get.

The digitalization of marketing and processes is still a constant change for the Chemical Industry. When it comes to implementation, enablement, work culture, and environment to bring new digital tools, the disparity is cultural and organizational. The second part of this questionnaire aims to empathize with the challenges they face to turn traditional methods into a new marketing strategy.

**Description of the interviewee and its role at the company**

- What is your current position at the company?
- What does it change for you and your role when a new marketing tool is implemented?

**Accessibility and usability of the tools available**

- How do you describe the usability you have towards digital marketing?
- From unsatisfactory to excellent, how do you assess your company's digitalization strategy and why?
- How important you perceive digital tools when it comes to new business development and marketing strategies? (Important, not important and why)
- Which digital tools in marketing have been used in the past years? And for what have you used those?
- How effective are those tools/technologies in your company’s marketing?
- What are the obstacles you see to implement a new approach when it is needed?
- How can your current and new digital tools help you gain space in a new market?

## APPENDIX B – INTERVIEW SCRIPT FOR EXTERNAL STAKEHOLDERS

The business project proposal was to identify market trends and customer's needs. The marketing goal was to develop a digital customer journey for the identified personas in this market. Those two goals walk side by side and, therefore, needed to hold hands. A questionnaire described in chapter 3 aimed to acquire results for both sides: business and persona development. The questions ahead related following the respective path: general questions about the interviewee and its role, how they work, with whom they partner, the role of additives, and what to expect from Company X.

### Description of the interviewee and its role at the company

1 Tell me more about yourself and your role at the company.

2 Tell me more about how important plastic recycling is for the company and also for your position.

2.1 What/who has been the main drivers for this topic internally and externally?

2.2 Is there a dedicated team or department focused on sustainability, specifically driving plastic recycling? What role do they play internally?

3 What are you hearing from various market players within the value chain?

4 What are the top three challenges you face when it comes to the mechanical recycling of plastics?

### How they work

1 Think about the last time you had to find technical solutions to problems involving mechanical plastic recycling. Walk me through how that worked.

1.1 How did the problem or topic arise?

1.2 Where did you go to find potential solutions?

1.3 Who did you consult? Which partners?

1.4 How did the collaboration work? Who took the lead?

1.5 To what extent are other departments involved (purchasing, logistics, marketing, etc.)?

2 Now, I would like to zoom out a little and reflect on that example you shared:

2.1 What worked really well in that process?

2.2 What did not work very well?

2.3 How would you structure that process differently in the future?

**Working with partners**

Here the image of the value chain given in figure 7, section 4.3, was displayed to the interviewee.

1 What is your first impression? Does this picture reflect your experience in the mechanical recycling market?

1.1 Which of these players are you currently engaging directly, especially when it comes to mechanical recycling?

1.2 And which of these players do you plan to engage more with in the future? Why?

1.3 In general, where do you go to find the right partners to engage with? How do you find them?

2 Think of the last time you collaborated [with the players mentioned above] and walk me through how that worked.

2.1 What prompted the collaboration to initiate?

2.2 Which role/function do you usually seek to engage within the partner organization?

2.3 What worked really well in the collaboration? And what did not work well?

2.4 What would you do differently?

**[Recycler only] Specific topics and challenges**

1 Diverse waste streams: I would like to raise the topic of diverse waste streams quickly. I know that this has been a big challenge for the whole value chain, but specifically also for recyclers.

1.1 To what extent do you consider this to be a significant problem in your work?

1.2 What are you currently doing to tackle that problem?

2 Aside from the waste stream challenge, what other challenges do you face as a recycler of plastics?

**Role of Additives**

1 To what extent you are familiar with chemical additives' role in treating recycled plastics since its product design?

2 What role do you think chemical additives can play in providing solutions to recycled plastics? Why do you say that?

3. Where do you go / who do you approach for input on how additives can help?

**The expected role of Company X**

X is a global chemical company that supplies plastic additives and other solutions for processing virgin and recycled plastics. To the extent that you are familiar with B, what role would you expect it to play in recycled plastics?