

02.2023

FIRM PROFILE

small firm
DIARIES

Ecoplasticas

CALI, COLOMBIA

LIFELONG DREAMS, DAILY STRUGGLES

By Rachael Eplee and Laura Freschi



ECOPLASTICAS, PLASTIC RECYCLING PLANT, CALI, COLOMBIA

Reinaldo Gómez' plastic recycling business sits on an unpaved road that runs along the Cauca River in Cali, Colombia's third largest city. (Names have been changed to protect study participants.) The road is lined with low-lying concrete and brick buildings with corrugated metal roofs—houses surrounded by locked metal grates, warehouses, and a plastic-table cafe selling cell phone minutes and soda. Kids on bikes navigate the potholes that fill with muddy water when it rains, passing by informal encampments of people sorting through trash, mostly plastic. Reinaldo's small processing plant backs up to the brown waterway, which runs 840 miles from the mountains of southwestern Colombia, through the agricultural heartlands of the Cauca valley, gathering garbage, chemicals, and human waste along its path, before joining the Magdalena River and emptying at the northwestern tip of the continent into the Caribbean Sea.

Reinaldo's business, Ecoplasticas, collects used plastic from local businesses and households, and processes the material into tiny, uniform pellets in a rainbow of colors. He sells these to companies to produce new plastic materials—like bottles, bags, clothes, and construction materials. Inside the plant the machines and tools that fill the warehouse, including a modified machete strapped to a post, two extruders, two washers, and five mills, are a mix of sophisticated and jerry-rigged, all covered in a thin layer of plastic dust and dirt. Surrounding the machinery are piles upon piles of bundled used plastic—Reinaldo reports having 8 tons of it at the start of the study—which workers hop over and around, carrying loads of material from one machine to the next.

REINALDO AND THE SMALL FIRM DIARIES

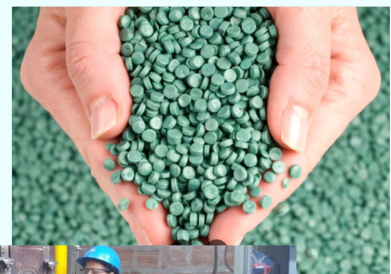
Reinaldo and Ecoplasticas were part of the Small Firm Diaries, a global study to better understand the small firms which are so central to the economy and prospects of low-income communities around the world. The Diaries are quite different from typical household or business surveys—rather than a one-time snapshot, Diaries participants report their cash flows weekly for a full year and answer extensive additional quantitative and qualitative surveys. Reinaldo and his firm are not particularly representative of the firms that participated in the Small Firm Diaries globally, or even those in Colombia. But the story of his firm does help illuminate why diaries studies are critical for understanding firms like his, and designing better products, programs and policies that enable those firms, their employees, and their communities to prosper and thrive.

In Colombia, the Ministry of Environment and Sustainable Development promotes a “circular economy” for plastics—where plastic waste is processed, recycled, and reused within the same community that produces it—through programs like subsidized lines of credit, tax incentives, and large public purchases of recycled raw materials¹. As a result, the recycling market is crowded—a Google search returns over 100 independently-operated waste management businesses in Cali alone. Most of these businesses gather used plastic and sell it to large processing plants, but some, like Ecoplasticas, have recognized the value in buying the machinery required to process the material themselves. Although it requires significant capital investment—and ongoing maintenance costs—since the machines required are specialized and expensive, Reinaldo hopes the investment will help him stay ahead of the competition.

Reinaldo is a passionate and ever-optimistic entrepreneur, excited to share stories of his struggles and successes with researchers and visitors. He is proud of the role his business plays in environmental sustainability, and feels confident the industry is on the rise. Sometimes, his enthusiasm bubbles over into outsized ideas about how an undifferentiated local plastic recycler fits into the global pecking order (one day we visited he reported spending hours applying for funding from an international competition to support innovative sustainable tech firms). It’s hard to imagine starting such a business, much less keeping it going for eight tumultuous years without his potentially quixotic can-do attitude and tenacity; he embodies the

common Colombian saying, “*todo tiene solución, menos la muerte.*” There’s a solution for everything, except death.

For many years, Reinaldo worked in the recycling business as a part of a cooperative, but had always dreamed of owning his own business. In 2014 he gathered his resources and contacts and launched Ecoplasticas with his son. Taking some skilled employees with them, they used personal savings, investments from friends and family, and a small bank loan to rent a space and purchase machinery.



Ecoplasticas’ finished plastic pellets, machinery, and raw materials

¹Ministerio de Ambiente y Desarrollo Sostenible, 2023.

Cash Flow and the Sources of Volatility

Ecoplasticas participated in the Small Firm Diaries study from May 2021 to May 2022. During that year Reinaldo met every week with Gloria Morera, a field researcher responsible for gathering data on five small firms in Cali. She interviewed Reinaldo, collecting data on all of his transactions for each week—income and expense flows (including payments to employees), payments on loans, and amounts withdrawn from or deposited into accounts. She also gathered information on how each of those transactions was conducted—whether in cash or electronically. (For detailed information on survey tools and methods, read *Methodology and Process: An Introduction to the Small Firm Diaries*, published at smallfirmdiaries.org.)

Weeks before the study began, in late April 2021, Colombia erupted in protests, demonstrations, and labor strikes. Anger over the government’s new tax policies, their handling of the Covid-19 pandemic, and episodes of police brutality and human rights violations brought floods of people into the streets, coincident with a third wave of Covid-19 infections.² Cali was considered the epicenter of the nation-wide protest movement, “*el paro nacional*,” and blockades, vandalism, and violence kept many businesses shuttered for weeks, dragged down productive capacity and led to many lost jobs, just as the country was starting to recover economically from the health crisis of the pandemic.³ The timing of the study in

relation to these major shocks undoubtedly affected the firms, but from the firm owners’ perspective, neither the pandemic nor the strikes were their biggest concern. When we asked about challenges and barriers, they were uniformly more focused on the prosaic day-to-day, week-to-week obstacles constantly in their path.

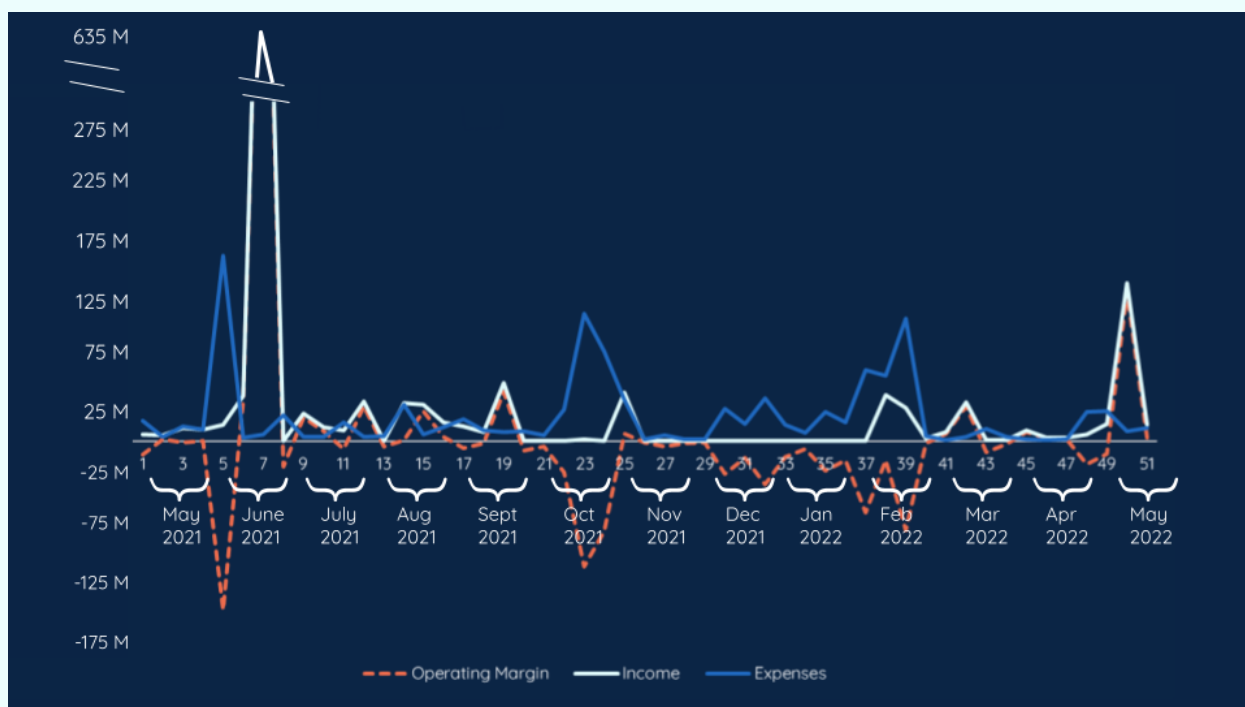
DEFINING A SMALL FIRM EMPLOYEE

Who qualifies as an employee is a major challenge to measuring employment in countries where many firms are not fully formal; it’s increasingly a problem in high-income countries, as contractor workers and platform work (e.g. delivery apps) proliferate. We designed the Diaries to allow firm owners to define who is an employee according to their perspective, rather than a more objective definition. During the first interview to determine whether firms met our sample criteria, we asked owners how many employees they had, without defining the term. (We did ask them to exclude people hired on a one-off basis to, for instance, deliver a product to a customer). At each subsequent weekly visit, we gathered data on employee count and wage payments. This detailed data allows us to see fluctuations along three different metrics: the number of total jobs at any given time, the number of individual people who fill those jobs, and the amount each individual is paid.

² Tariq et al., 2022

³ Hernandez and Marczak, 2021

CHART 1: OVERVIEW OF ECOPLASTICAS' CASH FLOW, WEEKS 8 to 52



During the study, Ecoplasticas earned on average COP 67 million per month in revenue (USD 14,700). The firm’s expenses averaged COP 56.8 million (USD 12,500) per month, and median monthly operating margin⁴—the measure we used to approximate profit in the study—was COP 11 million (USD 2,400). These figures place the firm within the highest earning group: the average firm in the Colombian sample had margins less than half that amount each month. Five weeks into the study,⁵ in June of 2021, Ecoplasticas incurred

an unusually large expense: a payment to a broker of COP 3.3 million (USD 700) to assist in making a bulk sale of recycled pellets. The unusual expense paid off—two weeks later Reinaldo reported the broker had arranged the largest sale by far of COP 635 million (about USD 140,000), recorded during the year. That income was not just a healthy return on the expense of the broker; it turned out to be vital to Reinaldo’s ability to weather challenges in the coming months.

This income spike, in itself, is a potent illustration of the value of the Small Firm Diaries. It’s impossible to understand the

less reliable. In Chart 1 we include these months, however, because they contain two events important to Reinaldo’s story and we believe that at least the large transactions and expenses reported in this period are correct.

⁴ We use operating margin—revenue less expenses, *not including payments to the owner or the owner’s family*—as a primary measure, rather than profit, since a true measure of profit would include features like depreciation and amortization that were beyond the scope of the study to calculate accurately.

⁵ In most Small Firm Diaries analysis, we drop the first two months of data collected. During this period, the field researcher and firm owner are still establishing familiarity and confidence and consequently we consider data from this period to be

state of the firm without capturing this one big sale. A one-time survey just before or just after the spike would provide a wholly distorted view of the firm. At the same time, a snapshot just seven months later, even if it asked Reinaldo to recall the past 6 months, would provide a similarly distorted view of the firm. Diaries allow us to understand the spike, where it came from, and its relation to the firm’s “normal” operations and cash flows.

Weeks 9 through 20 (July through September) were the most stable period of the study for Ecoplasticas, as the plant produced plastic pellets at what Reinaldo termed a normal pace, and had positive, if modest, margins. Expenses, which included employee payments, raw materials, rent, taxes and other running costs, were consistent. In week 23 (late October), Reinaldo reported a large raw material purchase of COP 100 million. This, he explained, was common practice to ensure he would have enough raw materials to fill future orders.

Just after this large purchase, a long-running struggle with the electric company came to a head. The plant had long suffered from intermittent neighborhood power outages, which interfered with production and ultimately Reinaldo’s income. It also led to Reinaldo disputing his bills with the power company and ultimately refusing to pay what he considered unfair charges. Now rather than just unreliable neighborhood power, Reinaldo would have to contend with the power company cutting his plant’s power over the unpaid balances. Consequently, between weeks 25 and 37, Ecoplasticas stopped production entirely.

Ecoplasticas’ cash reserves dwindled, as Reinaldo didn’t stop all the firm’s spending. While employee expenses dropped dramatically, he did continue to pay some of his skilled employees. As we will see in the section on employment, although he paid fewer workers during the production shutdown, his wage bill didn’t decrease proportionately because the workers he kept through the production shutdown were more skilled and more highly paid (see Table 1).

TABLE 1: WEEKLY AVERAGE EMPLOYMENT

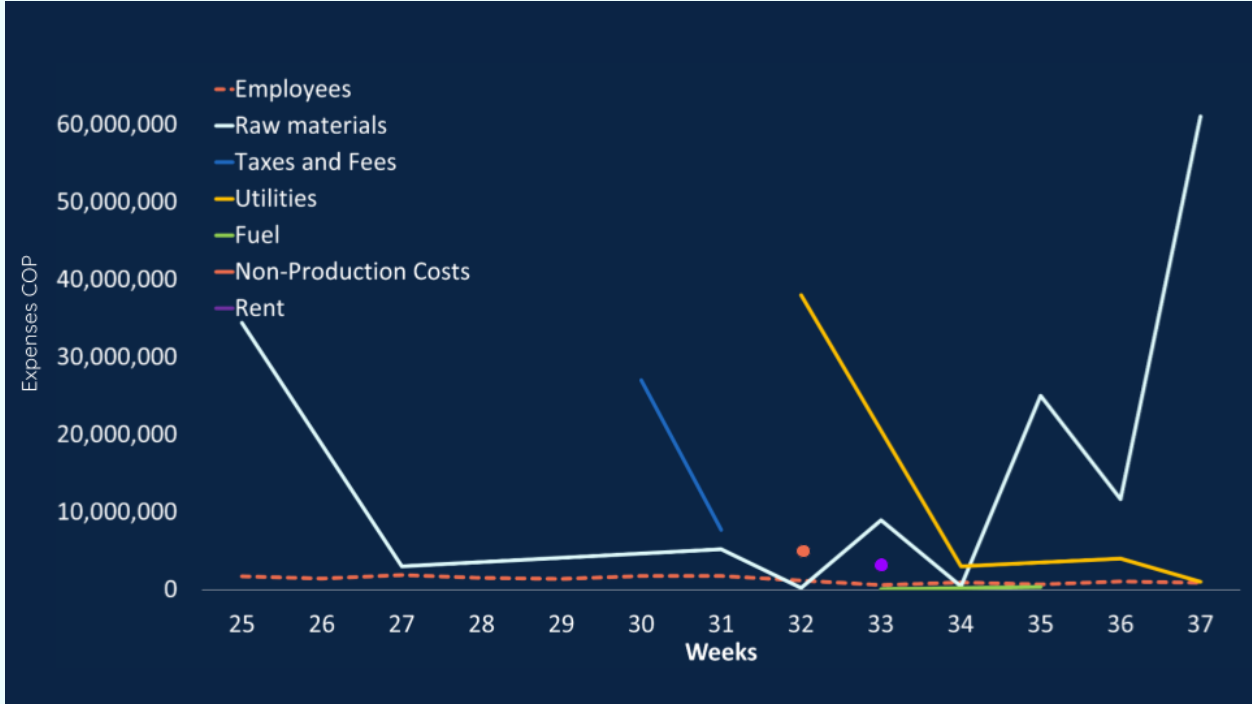
	Stable Period (Weeks 9-20)	Production Shutdown (Weeks 25-37)
Avg weekly employees	20	6.5
Avg weekly wage bill	COP 3.2 million	COP 1.2 million
Avg per capita weekly wage bill	COP 160,000	COP 184,615

Reinaldo kept paying other expenses he deemed necessary to ensure he could resume operation, believing that he would ultimately prevail in his dispute with the utility. Chart 2 shows the expenses he incurred during this dormant period. He paid part of his electric bill; he also continued to pay taxes and fees, and other non-production costs—things like cleaning products, drinking water, and toilet paper—for the workers who remained.

Reinaldo felt it was a priority to maintain relationships with suppliers and customers, even during the shutdown. That’s why he continued to purchase raw materials; he also bought some already-processed plastic pellets from a competitor to meet customers’ demand. To quickly gather the capital for these purchases, he turned to employees and friends to form an informal investment group. Each person contributed what they could from personal funds to a pot of COP 111 million (USD 24,000) to be paid back over 5 years at 1% interest.

Given Reinaldo’s use of formal financial services—his firm would be considered highly integrated into the formal financial system by our metrics⁶—it’s particularly telling that he did not turn to one of his banks (see Financial Tools) for a line of credit or other working capital management product. The need for working capital and tools to manage liquidity is common among the small firms we studied.

CHART 2: PRODUCTION SHUTDOWN EXPENSES



⁶ See the Colombia Country Report and the Colombia Financial Access Issue Brief at smallfirmidiaries.org for more details on how we measure formal financial integration.

By December, the business was barely afloat and Reinaldo saw no end to his long dispute with the energy company. “It was a rat against a tiger!” he said, describing his long odds of success. In any case, the national and state governments have been trying to clean up the Cauca—source of most of Cali’s drinking water—discouraging people and industrial operations from building along its banks, which adds more sewage runoff and waste to the dying river.⁷ Ecoplasticas was located in an area along the river zoned for mixed residential and industrial use. Taking a big risk, given his ongoing fight with the utility company, Reinaldo decided to relocate to another part of the city zoned exclusively for industrial plants, with, he believed, more consistent electricity supply.

In January he began paying rent at the new facility. Over the next weeks Reinaldo and his skeleton crew moved the Ecoplasticas operation to the new plant. Chart 2 shows he made a large purchase of raw materials for COP 61 million (USD 13,330) to feed the machines as the team slowly resumed production in February. Once up and running, he began repaying the loan to his informal investment group, and had repaid half by the end of the study in May.

Compared to other firms in the Colombian sample, transaction sizes at Ecoplasticas were much larger. These large transactions mean the coefficient of variation—a quantitative measure of amount of change over time that we use to describe the amount of variability in a given metric—of Ecoplasticas’ revenue and expenses are significantly higher than sample averages. Ecoplasticas may be an

extreme example, but it is a clear illustration of volatility as a central feature of the lives of the small firms we studied, across our global sample—a feature that is entirely obscured in surveys that capture “average” monthly revenue, or yearly revenue.

Reinaldo says that stability is a priority for the firm, but erratic electricity supply prevents him from earning consistent revenues, even when he has a reliable source of input materials and customers to purchase his products. An emerging theme from the Colombian and global samples is that the small firms in our study do not consider growth and stability as opposing goals. In Colombia, more than 70% of firms who aspired to growth also aspired to stability (including Reinaldo) when asked about their 5-year vision for their business. Indeed, a concern for stability, and an interest in working capital (as opposed to investment capital) to smooth out periods of illiquidity seem a logical response to the way that outside factors wreak havoc on the best-laid growth strategies. Reinaldo’s willingness to take on risk, his (as-yet unrealized) effort pursuing larger capital investments, and his own words highlight that the desire for stability is not in opposition to an aspiration for growth. “We’re going through a tough period, but we’ll pull out of this,” he says, “one way or another, we’ll keep growing.”

Overall, many of the firms are averse to taking on more risk than they already face; but Reinaldo seems to make moves with unclear prospects for payoff, as in his gamble for a better power supply at a second location while still embroiled in a fight with the power company at the first.

⁷ Sánchez et al., 2022

Employment

Over the course of the study, Reinaldo paid over 50 individuals. But the median number of employees paid per week was 9 and the median tenure for an individual employee at his firm was only 6.5 weeks. The very high amount of employee turnover at Ecoplasticas is similar to other firms in our sample in Colombia and around the world, complicating existing estimates of how many people are employed by micro and small firms. These estimates are usually compiled from nationally representative household surveys conducted by governments, where households are asked about the sources of their income. Given what we've learned about how much the number of employees in a firm changes month-to-month, and how often who holds the jobs in a firm changes, it's unclear whether extrapolating from household surveys gives an accurate picture of a large portion of the labor market. As part of the Small Firm Diaries, we interview a worker in each firm, asking a variety of questions about their household finances and labor market experiences. In those surveys we see that workers in small firms appear to be quite a distinct segment from the rest of the labor market. Very few workers report prior income from larger firms or owning their own microenterprise—the most common prior source of income is a job at a similar small firm.

Ecoplasticas provides a look at how employment at a small firm works in practice. Six people are required to operate the processing plant. Of these six, three are skilled workers who know how to operate the machinery. The other three are occupied sorting and hauling the mountains of unprocessed plastic that take up more than 2000 square feet in the ramshackle warehouse, jobs which require stamina and attention, but no specific training or knowledge. Reinaldo sees these unskilled laborers more like temporary contract workers than formal employees. Of the workers who worked the least frequently (those who were paid between one and five weeks of the year) none of them were paid when the plant was shut down. These men (Reinaldo's labor force is made up predominantly of men) were a disposable labor force that Reinaldo could shed to keep the firm above water during the shut down.

A qualitatively different, smaller group of workers were employed most consistently. Reinaldo explained that this “core” group included specialized employees—mechanics, engineers, and a bookkeeper—critical to both his long-term operation and his ambitions to grow into international markets. “It's not easy to find qualified people who can run my machines,” he explains. He also sought specialized expertise from outside the firm boundaries (for example when he hired a broker in January to help him offload an unusually large amount of product).⁸

⁸ For other studies on the structure of labor markets and skilled vs unskilled work, see Blattman and Dercon, 2018; Anderson and McKenzie, 2020; Breza, Kaur, and Shamdasani, 2021; Breza, Kaur, and Krishnaswamy 2022; and Hardy et al., 2023.

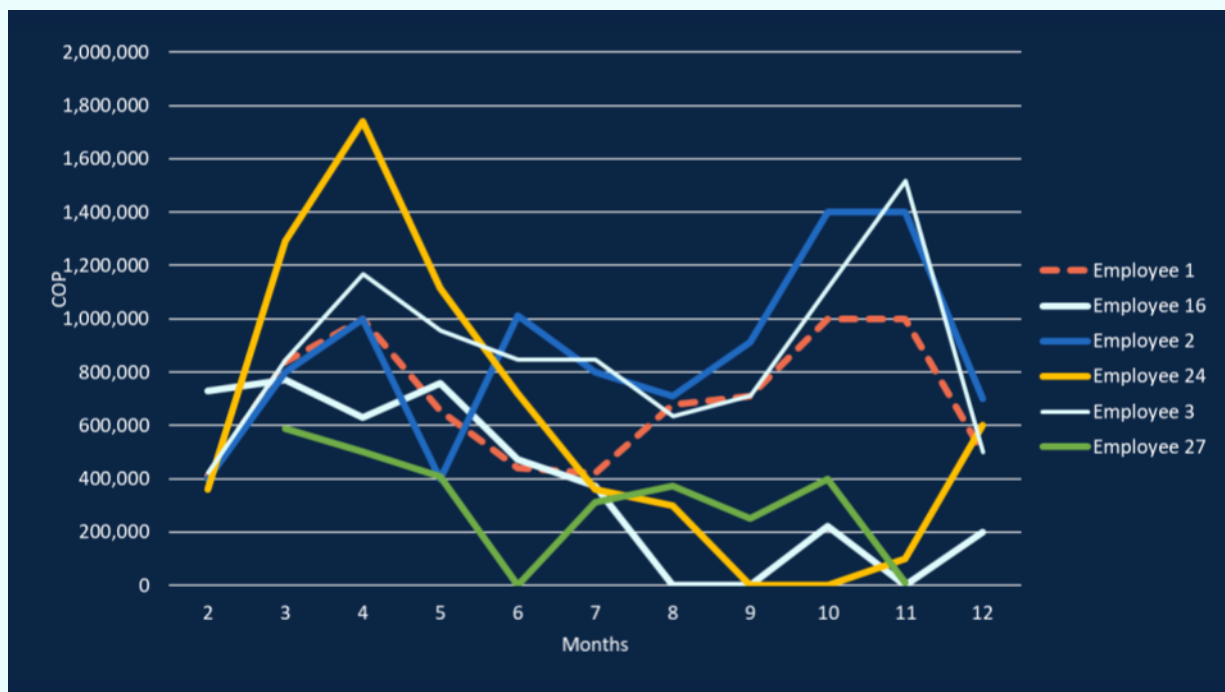
CHART 3: EMPLOYEE COUNT AND PAYMENTS, MONTHS 2 to 12



In Chart 3 we see Ecoplasticas’ employees classified into two groups: “core” employees, paid during 8 or more months, and “rotating” employees, paid less than 8 months, including a sizable proportion of those (44%) paid fewer than 5 times in total.

When we first met Reinaldo he was still building back his labor force after the protests and labor strikes of late April and May; we see him slowly adding both core and rotating employees from June to August, reaching a peak between August and September. The number of core employees, shown in red on the chart, is constant, while the blue area illustrating rotating employees peaks and dips dramatically. The mechanism of the rotating work force allows the business to respond flexibly to shocks, expanding when business conditions are good to meet demand, and shrinking to withstand lean times. Across the sample we see that firms’ lack of liquidity management tools means that employees bear the brunt of the revenue volatility that firms experience.

CHART 4: PAYMENTS TO INDIVIDUAL CORE EMPLOYEES



In fact, in Chart 4 we see that even those who are most frequently paid by no means receive a consistent salary from month to month. For instance, one employee who was paid during every month of the study saw his monthly pay fluctuate between COP 400,000 and COP 1.6 million.

In February (month 10) when Reinaldo opens his plant at the new location, we see a slight uptick in rotating employees, but—despite the more upbeat story we heard about business quickly picking back up—employee count numbers reveal that the firm is still struggling to regain lost ground, even into the spring. The dotted line showing the wage bill tracks closely with employee count and then diverges, showing that the firm shifts to paying more per employee as the production shutdown sets in, and continues with these higher payments as the firm re-opens.

Financial Tools

Like most of the firms in the Colombian sample, and indeed across all of the countries in the Small Firm Diaries, the vast majority (96%) of Ecoplasticas' transactions reported during the course of the year were in cash. Even though his status as a relatively high earner in the sample, with above-average transaction sizes, would seem to make him a good candidate for digital methods of payment, Reinaldo says he prefers to transact in cash and sees it as a more reliable way of doing business. He explains that he pays his employees in cash because most of his workers don't have formal bank accounts, and if they do, they prefer cash to avoid paying any transfer fees. He also prefers to pay for raw materials, fuel, utilities, taxes, bank costs, and rent all in cash, since he says it

makes his accounting easier—a challenge to one of the most commonly touted benefits of digital financial services.

At the same time, Reinaldo sees greater use of the banking system as critical to the growth of his business and gaining access to higher-level suppliers and clients. An increasing number of his larger clients requested to make payments via bank transfer but, to avoid fees, were only willing to send money to accounts at the bank they use. To comply, Reinaldo opened—and reported occasional payments into—new accounts at three different banks.

As a strategy, he offers the option to pay via bank transfer only for his largest suppliers and customers, for transfers of COP 30 million (USD 6,000) or more. Other clients pay with cash, check, or, most rarely, mobile money. His smaller suppliers are individuals and households who sell their personal recycling in small quantities. For these clients, who do not have a way of providing an invoice, he accepts payments to a personal savings account or through his mobile money account.

Reinaldo also has a personal credit card which he keeps on hand for when he urgently needs to make lumpy purchases—yet another partial, jerry-rigged solution to a working capital management problem. For example, if a supplier has extra raw materials that he wants to offload, Reinaldo will buy it with the credit card, and pay off the card as soon as he’s processed the material and made a sale. He says that he prioritizes making regular credit card payments and tries to keep the balance low or at zero to have his full line of credit available. Still, during the study when he needed large sums of working capital, he chose options other than the credit card, with lower interest (for example when he formed an informal investment group from employees and friends and set the interest rate at 1%.)

TABLE 1: ECOPLASTICAS’ TRANSACTIONS BY TYPE AND FREQUENCY, WEEKS 1 to 53

Transaction Type	Frequency	Percentage	Median	Maximum	Minimum
Bank transfer	17	2.77	322,000	53,000,000	90,000
Cash	593	96.73	208,102	140,000,000	10,000
Mobile money	1	0.16	355,200	355,200	355,200
Not specified	2	0.33	568,450	700,000	436,900

Conclusion

The story of Ecoplasticas—its dramatic ups and downs within the space of a single year—reveals the challenges and coping mechanisms employed by millions of small firm owners facing similarly difficult and unpredictable business conditions, and illustrates the value of high frequency data collection.

Compared to sample averages, Reinaldo's firm is in some ways atypically high-performing. During good months, his revenue and operating margins are at the high end of firms in our sample. The firm benefits from a relatively consistent supply of raw materials, and strong customer demand. He is well integrated into the formal financial system, and equipped to transact digitally with customers and suppliers through several channels. He wants to grow his business, and has ideas and plans for how to expand beyond Cali, and even into international markets.

And yet, Ecoplasticas is more similar to smaller firms with less ambitious owners than it is different—and the challenges it faces pose a similar, near existential threat. The firm is dogged by **volatility**—of revenue, of margin, even of operation—due largely to factors (inconsistent electricity, civil unrest) that are outside the owner's control, difficult to foresee, and time-consuming to manage and recover from. External factors play a huge role in the outcomes and prospects of firms across the global sample, and the tools available for firm owners to stabilize their business are few.

That means that employees bear a huge part of the burden imposed by volatility, resulting in **fragile jobs and fragile workers**. A key aim of the study was to shed light on employment in small firms, including a better understanding of who the employees of small firms are, and the quality of jobs in the small firm sector. We discovered that much of the precarity of small firms falls on the shoulders of employees, as firm owners respond to volatility by shedding or suspending jobs, and that employees struggle to absorb this impact as they live closer to the poverty line than their employers, and most cannot easily move to other parts of the labor market.

A snapshot of Reinaldo's business at any one point in time during the year studied would have shown a radically different picture from one month to the next—in September we would have seen a stable business poised for growth in a growing industry; by November we would have seen a powered-down plant barely scraping by; had we met him in February we might have seen a brand-new firm, just starting operation in a new facility.

Ecoplasticas may have moved locations, but in terms of performance it is in much the same place at the end of the study as it was at the beginning. Indeed most firms in the study don't grow much, and they don't shrink much either. From the perspective of an annual survey, these firms may look like they are standing still. But it would be very much a mistake to say that they are stagnant. Far from just treading water, Reinaldo is more like an open water sprinter in rough seas—just as he crests one wave, another arrives to knock him sideways.

By collecting data every week for a full year, we perceive the extent of the volatility of the firms' financial life in every aspect—from revenues to expenses to operating margins to employment—and begin to discern the outlines of the kinds of support that could help Reinaldo get the best of his day-to-day struggles, and realize his dreams.

Credits

The principal investigators for the Small Firm Diaries global project are Timothy Ogden and Jonathan Morduch; and for the Colombian arm of the study, Luz Magdalena Salas Bahamón and Jana Schmutzler De Uribe. The principal investigators acknowledge the contributions of Rachael Eplee, Laura Freschi, Michelle Kempis, Yeji Lee, and David Pinedo de la Hoz in creating this Small Firm Diaries profile.

The Small Firm Diaries global project is led by the Financial Access Initiative (FAI) at NYU Wagner. Field research was carried out by L-IFT and MFO. Funding for the global study was provided by the Mastercard Center for Inclusive Growth and the Bill & Melinda Gates Foundation. In Colombia, additional funding came from the Argidius Foundation, and the Aspen Network of Development Entrepreneurs (ANDE). In Colombia, FAI is grateful for research partnerships with Pontificia Universidad Javeriana and Universidad del Norte; and for partnerships with expert contributors at the National Department of Planning; the Chambers of Commerce in Bogota, Barranquilla, and Cali; Fundación Carvajal; Fundación Capital; Fundes; Fundación WWB; Asobancaria, and Banco de las Oportunidades.

About the Study

The Small Firm Diaries is a global initiative to better understand small firms in low-income neighborhoods of developing countries.

Visit smallfirmdiaries.org for more information and additional publications.

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