PEPSICO SUPPLY CHAIN & GENDER ASSESSMENT

Barriers & Opportunities to Promote Women's Economic Empowerment in Colombia

August 2021

This report is made possible by the generous support of the American people through the United States Agency for International Development (USAID) and PepsiCo. The contents are the responsibility of Fedesarrollo and Resonance and do not necessarily reflect the views of USAID, PepsiCo, or the United States Government. It was prepared by Fedesarrollo and Resonance under Agreement No. 7200AA20CA00001.

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Cover Photo: Luz Dary Gelpud Rojas, a Colombian woman farmer, checks the health of flowering potato fields. Courtesy of IDRC / BARTAY

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ABBREVIATIONS & DEFINITIONS

AGROSAVIA	Colombian Agricultural Research Corporation
ASOAGROTOCA	Association of Potato Producers from Toca, Boyacá
ASORQUIDEA	Association of Potato Producers from Soraca, Boyacá
ASOHOFRUCOL	Colombian Hortifrutícola Association
ASPLABEL	Association of Plantain Producers from Belen de Umbria, Risaralda
ASPROAGRO	Association of Plantain Producers from Argelia, Valle
CNA	National Agricultural-Census
FAG	Agricultural Guarantee Fund
FEDEPAPA	Colombian Federation of Potato Producers
FINAGRO	Agricultural Sector Financing Fund
FUNDES	Foundation of Higher Education Monseñor Abraham Escudero Montoya
GDA	Global Development Alliance
ICA	Colombian Agricultural Institute
IDI	In-depth Interviews
IPC	Consumer Price Index
IPV	Intimate Partner Violence
KII	Key Informant Interview
LEC	Special Line of Credit
SAC	Colombian Society of Farmers
SDG	Sustainable Development Goals
SENA	National Learning Service
SFP	Sustainable Farm Program
SIIL	Sustainable Intensification Innovation Lab
SIPSA	Market Information System
UNAL	National University of Colombia

UPA	Agricultural Productive Unit
USAID	United States Agency for International Development
WEE	Women’s Economic Empowerment

EXECUTIVE SUMMARY

The main goal of this study is to understand PepsiCo's supply chain including the roles men and women have on-farm; perceptions of women in agro industry; barriers and opportunities women encounter in accessing the supply chain as direct suppliers, producers, or on-farm workers; and, access to technical assistance, technology, finance, and inputs needed to produce to PepsiCo's specifications. This information will inform the development of field activities for the Investing in Women to Strengthen Supply Chains Global Development Alliance (GDA) in Colombia.

1. PepsiCo Potato Supply Chain and Women's Barriers and Opportunities

Potato supply chain: PepsiCo has 81 suppliers, each producing an average of 987 tons per year on an average farm size of 24.6 ha; annually totalling nearly 80,000 tons of potato. Interviews revealed that PepsiCo mostly works with producers that cultivate more than 10 ha, and prefers to work with suppliers that have the greatest production efficiency. Current volume supplies three PepsiCo processing plants for the production of potato chips sold under the brands *Papas Margarita* and *De Todito*. The industrial plants are located in Funza (Cundinamarca), Bogotá (Cundinamarca) and Sabaneta (Antioquia).

Technical assistance: PepsiCo does not provide technical assistance to its producers. In general, potato growers have little access to irrigation systems and depend mostly on rain. This can make potato production a high-risk investment due to unpredictable weather patterns and climate change contributing to harsher growing conditions including drought and increased incidence of pests and diseases. PepsiCo's suppliers are responsible for all transportation costs involved in transporting produce to PepsiCo plants. The PepsiCo Foundation has worked to strengthen the capacity of two women-led associations in Boyacá that currently provide 3.7% of the supply: *ASOAGROTOCA*, led by women and comprised of 23 female producers, and ASORQUIDEA, comprised of 21 families (17 female-led and four male-led).

Women in the supply chain: Gender roles in PepsiCo's potato supply chain correspond to a variety of cultural and historical influences that have led to minimized roles for women in direct production and farm leadership. Out of the current 81 PepsiCo suppliers, 65.4% are individual men, 17.3% are companies and 13.6% are women with individual contracts. Women are often involved in the following:

- negotiations and commercial activities on small scale farms in women-led associations
- administrative duties on large farms such as bookkeeping, processing loans, purchasing supplies, and hiring workers; wives perform these tasks on small farms
- preparing worker's meals, particularly during harvests
- providing technical assistance to smallholder farmers through FEDEPAPA or local agro service shops
- accompanying their families as laborers; note that women in Nariño tend to be more involved than women in Boyacá and Cundinamarca
- feeding and milking animals

Women are rarely involved in the following:

- potato rotation activities
- most stages of field work: from preparing the soil to harvesting and packaging

2. PepsiCo Plantain Supply Chain and Women's Barriers and Opportunities

Plantain supply chain: PepsiCo purchases 29,000 tons of plantain, of which 24,000 are green and 5,000 are ripe. According to data from the Agricultural Census this is 1% of the plantain grown in Colombia. PepsiCo processes green plantain slices and ripe plantain slices sold under the brands *NatuChips Plátano Verde* (green plantain) and *NatuChips Maduritos* (ripe plantain). The processing plants are located in the industrial zone of Bogotá, which receives raw material from Meta and the Coffee Region; and in Sabaneta (Antioquia), which receives raw material from all over Antioquia and the Coffee Region. The *Maquilas* (peeling plants) receive plantain from the plantain farms. In some cases, farms also own *Maquilas*. The *Maquilas* buy unpeeled plantain from five contract holders, one of which is an association with 52 members; from four producers of ripe plantain with peel; and from eight producers of peeled green plantain that simultaneously cultivate green plantain and have *Maquilas*. Of the eight producers of peeled green plantain, two are associations with 160 members, of which 18 are women. Including the members of the associations, there are 226 producers, of which 20 are women (8.8%). Of the 20 women, 18 belong to associations and two are producers that have contracts with PepsiCo. Graphical representation of this supply chain found in the report in Figure 2.

Technical Assistance: PepsiCo does not provide technical assistance to plantain producers or associations. Large producers directly contract technical assistance from input suppliers and agronomists. Small producers who are association members receive technical assistance from the association, which is generally financed with resources from the Ministry of Agriculture or international cooperation programs.

Association strengthening: The PepsiCo Foundation also works with plantain associations to bolster their capacity and supply to PepsiCo. Members of the PepsiCo Foundation suggest that the process of working with plantain associations in the Coffee Region has been less intensive and demanding than with potato associations in Boyacá. Plantain associations had previous experience working as an association and supplying to large corporations like PepsiCo. Unlike Boyacá's associations, plantain associations in the Coffee Region are not women-led and a minority of association membership is female.

Women in the supply chain: Women are mostly absent from on-farm plantain agricultural activity, and unlike the potato supply chain, no women-led associations with majority female members exist in the supply chain. Due to cultural and gender norms, as well as lack of machinery for heavy physical labor, women are often involved in specific activities. Only two individual women producers hold direct contracts with PepsiCo. Of the two associations, none are women-led and only 16.6% of ASPLABEL (10/60) and 8% of ASPROAGRO (8/100) members are women. Women are mostly absent from the production process as workers (planting, sowing, harvesting, packing). In contrast, women represent about 90% of plantain peelers. Women are often involved in the following roles:

- *Cormo* selection and plantain cleaning
- Logistical and administrative tasks
- Food preparation for workers
- Technical assistance and sales personnel for agricultural commodity companies
- Plantain peeling in the *Maquilas* (about 90% of peelers are women)
- Managing or buying plantain peel waste

3. Key Women's Barriers to Accessing PepsiCo's Supply Chain

First, in Colombia, women are less likely to access and manage land. When a woman's partner is in charge of crop production, she is less likely to decide what, where, or how to plant if they do not own the land. Second, unpaid care and domestic work affects women's availability to lead agricultural processes, attend trainings and business convenings, and leave their farms for commercial activities. Third, lack of digital inclusion and digital skills represent a barrier for rural women in agriculture, particularly following the impact of Covid-19 restrictions, to information, online training opportunities, and connecting to buyers. Fourth, most activities require physical strength and/or labor, since farmers lack the technology to automate processes. Lastly, sexual harassment, microagressions in the male-dominated potato and plantain industries inhibit women from fully participating in networking, training, and commercial activities.

In the case of plantain peeling in the *Maquilas*, early/late working schedules could put women at risk. Respondents reported harassment on public transportation and safety risks in walking after dark. In addition, peak harvest periods often require laborers to stay overnight on-farm for several days, as respondents in Meta confirmed. This system can have a greater impact on women that cannot leave their families and children for several days to harvest. Contractors play a key role in hiring for large plantain farms. The few women involved in the production process of large farms in Meta were hired by contractors in the town of Granada. Women working in *Maquilas* live in urban areas, Bogotá, or small towns, but not in rural areas.

Social and cultural norms differ by region, and affect women's involvement in the production, harvesting, and post-harvesting processes.It is important to consider the significant differences between women and men producers based on geography.

4. Recommendations Developed in Country Planning

Based on current supply chain realities and PepsiCo growth objectives, three entry points including (1) large farms and maquilas; (2) associations; and, (3) PepsiCo internal staff capacity should be considered for gender responsive actions and interventions that will contribute to women's empowerment in strengthening PepsiCo's supply chain. Activities on large farms are intended to address crop performance and quality, regenerative agriculture, and PepsiCo livelihood goals. Activities related to associations are intended to address the need to increase volume sourced in new regions as well as to to improve farmer loyalty and product quality. Activities related to building PepsiCo internal capacity will address PepsiCo livelihood goals, which are part of PepsiCo's global regenerative agriculture goals. Additional details on the process for how activities will move the needle on addressing PepsiCo's goals are outlined in the full report.

1. INTRODUCTION

In rural Colombia, women face many challenges to fully participate in agricultural supply chains particularly with large corporations such as PepsiCo. The main goal of this study is to understand PepsiCo's supply chain including the roles men and women have on-farm; perceptions of women in agro industry; barriers and opportunities women encounter in accessing the supply chain as direct suppliers, producers, or on-farm workers; and, access to technical assistance, technology, finance, and inputs needed to produce to PepsiCo's specifications.

1.1. Barriers to Women's Access of PepsiCo's Agricultural Supply Chains in Colombia

In Colombia, men own 73.88% of the country's Agricultural Productive Units (UPA), while women own 26.12%[1]. In fact, the asset holding gap negatively impacts the opportunity to grow and control their production[2]. It is estimated that in 2018, only 27% of women involved in agriculture had access to formal loans. This figure was 71% for men[3]. Due to the lack of productive assets that serve as collateral, rural producers, especially women, tend to access informal financing mechanisms with excessively high interest rates[4]. Although women can, in principle, access financial resources such as loans, they tend to pay interest rates much higher than those paid by men. A study carried out by Fedesarrollo showed that informal loans in Colombia have an interest rate of 81% per year versus 19.2% per year at an average bank. For women, credit is typically available through formal associations and cooperatives. Agrarian Bank, a government-owned bank and the largest lender for agricultural production, also offers the *Mujer Rural* (Rural Women) program, which provides loans at interest rates between 10% and 14%[5]. The study showed that rural women tend to have low financial literacy as a consequence of the lack of economic inclusion and isolation from production and business activities. Finally, this study showed that women do not have access to financial inclusion instruments due to lack of collateral which restricts them from obtaining additional credit offered by Agrarian Bank.

Technical training is usually aimed at men, insofar as they are the owners and holders of the contracts and/or the land. Women tend to participate in agricultural trainings and workshops only when their husbands do not have the time or desire to attend[6]. . Many men do not allow their wives to attend those workshops or to make autonomous decisions for fear of losing authority. This can put women at risk of Gender-Based Violence (GBV)[7].

Men participate more in decision-making related to production (crop selection, irrigation, and direct sowing, etc.). Women participate more in the process prior to the final decision — fertilization, manual weed control, chemical weed control and/or pest control, guidance or negotiation — than in making final

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[1] Calculations based on: DANE. *Tomo 2. 3er Censo Nacional Agropecuario. Hay campo para todos.* 2014. https://www.dane.gov.co/files/images/foros/foro-de-entrega-de-resultados-y-cierre-3-censo-nacional-agropecuario/CNATomo2-Resultados.pdf

[2] Deere, C.D. Doss, C.R. *Gender and the Distribution of Wealth in Developing Countries.* 2006. WIDER Working Paper Series RP2006-115, World Institute for Development Economics Research (UNU-WIDER).

[3] USAID/COLOMBIA. *Gender Analysis and Assessment Final Report.* 2019.

[4] Ramírez, J. Martínez-Restrepo, S. Sabogal, A. Enríquez, E. Salas, R. Rodríguez, V. *Barreras de acceso de la mujer rural a crédito, programas asociativos y a la formalización de la tierra en el Norte del Cauca y el Sur del Tolima.* 2015. Fedesarrollo. https://www.repository.fedesarrollo.org.co/bitstream/handle/11445/2725/Repor_Abril_2015_Ramirez_et_al_Prod_3%20y%204.pdf?sequence=2&isAllowed=y

[5] Ibid.

[6] Cardona, C. *Gender equality analysis in Colombia's coffee sector.*

[7] Ibid.

decisions. This is because men trust their own experience more and seek advice from experts when necessary.[8]

The division of labor on farms is determined by social-cultural norms that affect women's opportunities to generate income and be economically autonomous. The role of women in care activities prompts them to seek jobs that provide flexible hours so they can be home to care for their children[9]. Social norms can also limit women's participation in training, fairs, and commercial activities outside the home. Women are socially isolated and have little time to carry out productive agricultural tasks and administrative procedures, networking, or make key connections to grow a business.

Rural women that live with reduced economic, social and political opportunities, are at increased risk of GBV by their domestic partner[10] which can affect their mental health, economic well being, and even their productivity output[11]. Rural women in traditionally masculine environments can also be prone to sexual harassment, microagressions and other chauvinistic behaviors that limit their opportunities to work and participate in value chains and commercial activities[12]. GBV can manifest itself in many ways, and its higher incidence among rural women has been found to be due to the traditional absence of the state in remote regions of the country[13]. In fact, in 2009-2014, the population of rural women was the one with the highest incidence of femicides, representing 16.85% of the national total[14].

1.2. Why Focus on Gender in PepsiCo's Supply Chain

Research shows that the empowerment of women working on smallholder and other farms could improve quality and volume of production, as well as improve profitability and sustainability.[15] *Empowerment* may include: increasing women's recognized participation on and ownership of family farms; creating more productive roles for women, as well as diversifying their roles within the supply chain; improving their access to technical and financial resources, services, and training; ensuring gender-sensitive working conditions for laborers; and increasing women's on-farm decision-making.

The SCGA starts by identifying differences between women and men in agricultural communities of PepsiCo's sourcing regions. The team assesses access issue**s** (like resources, training, and markets) and local gender norms (patterns of socially acceptable behaviors for women and men) to help agronomy

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[8] García, M. Katto, M. Twyman, J. La Hue, G. Chirinda N. *How might the gender roles affect the implementation of a new water-saving technique for Colombian rice production? Report of gender dimensions in Colombian rice production*. 2016. Working Paper. CIAT Publication No. 437. International Center for Tropical Agriculture (CIAT), Cali, Colombia.

[9] Friedemann-Sánchez, G. *Assets in intrahousehold bargaining among women workers in Colombia's cut-flower industry.* 2006. Feminist Economics, 12:1-2, 247-269, DOI: 10.1080/13545700500508551

[10] Iregui-Bohórquez, A, M. Ramírez-Giraldo, M.T & Tribín-Uribe. *Domestic Violence Against Rural Women in Colombia: The Role of Labor Income.* 2019. Feminist Economics, 25:2, 146-172, DOI: 10.1080/13545701.2019.1566752

[11] Martinez-Restrepo, M. Ramírez, J. Castillo, A. Castrillón-Guerrero, L. Calero, I. Mejía, J. Tafur, L. *El continuum de las violencias basadas en género en el contexto del conflicto armado colombiano y su relación con el empoderamiento económico de las sobrevivientes.* 2021.

[12] CINEP. *Mujeres rurales, indígenas y afros, aún más violentadas.* 2020. https://www.cinep.org.co/Home2/component/k2/847-mujeres-rurales-afros-y-campesinas-aun-mas-violentadas.html

[13] Vargas, S. *Violencias basadas en género contra las mujeres rurales.* 2019. https://www.cinep.org.co/Home2/component/k2/672-violencias-basadas-en-genero-contra-mujeres-rurales.html

[14] Ibid.

[15] *See:* FAO. *The State of Food and Agriculture: Women in Agriculture: Closing the Gender Gap for Development*. 2011. Rome.
Njuki, J. Kruger, E. Starr, L. *Increasing the Productivity and Empowerment of Women Smallholder Farmers*. 2013. Cooperative for Assistance and Relief Everywhere.
Anderson, C.L. Reynolds, T.W. Biscaye, P. Patwardhan, V. & Schmidt, C. *Economic Benefits of Empowering Women in Agriculture: Assumptions and Evidence.* 2020. The Journal of Development Studies, 1-16.

teams uncover ways to *reduce barriers* women face, and *leverage their skills and priorities* for involvement in crops like potato and plantains. The dynamics and opportunities outlined here will shape country-specific implementation plans. These consist of unique interventions that aim to increase gender inclusion in the PepsiCo supply chain, empower women farmers and laborers alongside men, and ultimately improve overall SFP compliance, yields, and quality of crops available to PepsiCo, among other business benefits.

Gender equality and Women's Economic Empowerment (WEE) is one of the 17 Sustainable Development Goals (SDGs), central to SDG 5, but also integral to all dimensions of inclusive and sustainable development.[16] Investment in women's economic empowerment is not only a moral imperative, but it is also good business. For example:

- It is estimated that reducing the existing gender labor participation and income gap could add $13 trillion to global Gross Domestic Product (GDP) by 2030[17].
- Colombia loses 11% of its GDP due to existing gender gaps in the labor market[18]. Companies with gender equity are 21% more likely to outperform their competitors[19].
- Currently, women represent a minority of producers and workers within PepsiCo's potato and plantain supply chain. In the potato value chain only 13% of the producers (contract holders) are women, and in the plantain only 1.7% are women. Women outside associations are absent from the overall value chain.
- Promoting a greater participation of women in the value chain can boost PepsiCo's productivity and innovation. Indeed, evidence shows that there are clear economic benefits, such as a significant reduction in production costs and an increase in cost-effectiveness, when women can participate in agricultural activities[20]. This is the case of rice production in Colombia, where researchers found that the Alternate Wetting and Drying technique reduced methane gas emissions by approximately 48% and water use by 30%[21].
- Agricultural programs that do not consider gendered responsibilities, resources, and constraints, are less likely to succeed in terms of increased productivity or benefitting smallholder farmers[22].
- Increasing women's participation in PepsiCo's value chain could benefit women's families, and society overall. Indeed, women are more likely to invest in the education and nutrition of their children, reducing the intergenerational transmission of poverty[23].

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[16] UN Women. *SDG 5: Achieve gender equality and empower all women and girls*. n.d. https://www.unwomen.org/en/news/in-focus/women-and-the-sdgs/sdg-5-gender-equality

[17] McKinsey Global Institute. *Don't let the pandemic set back gender equality.* McKinsey Global Institute, September 18, 2020. https://www.mckinsey.com/mgi/overview/in-the-news/dont-let-the-pandemic-set-back-gender-equality

[18] Cuberes, D. Newiak, M. Teignier, M. *Gender Inequality and Macroeconomic Performance.* In: *Women, Work and Economic Growth. Leveling the Playing Field.* 2017. https://www.elibrary.imf.org/doc/IMF071/23146-9781513516103/23146-9781513516103/Other_formats/Source_PDF/23146-9781475579062.pdf

[19] Insuco. BID. Corewoman. Minenergía. *Estudio sectorial de equidad de género para el sector Minero-Energético.* 2021. https://www.minenergia.gov.co/documents/10192/24274643/ESTUDIO+SECTORIAL+G%C3%89NERO+SME+2020.pdf

[20] García, M. Katto, M. Twyman, J. LaHue, G. Chirinda, N. *How might the gender roles affect the implementation of a new water-saving technique for Colombian rice production? Report of gender dimensions in Colombian rice production.* Working Paper. 2016. CIAT Publication No. 437. International Center for Tropical Agriculture (CIAT), Cali, Colombia. https://cgspace.cgiar.org/handle/10568/81594

[21] Ibid.

[22] Doss, C. *Women and agricultural productivity: Reframing the Issues.* 2018. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5726380/

[23] Kronfol, H. Nichols, A. Tran, T. *Women at Work : How Can Investment Incentives Be Used to Enhance Economic Opportunities for Women?* Policy Research Working Paper;No. 8935. World Bank, 2019. Washington, DC. © World Bank. https://openknowledge.worldbank.org/handle/10986/32055 License: CC BY 3.0 IGO.

- Increased income and employment for women within the PepsiCo' value chain could increase their intra-household bargaining power (decision-making). Evidence suggests that higher income and access to paid jobs protects women from domestic violence, particularly Intimate Partner Violence (IPV).[24]

PepsiCo has a great opportunity to increase the number of women that benefit from its value chain, while promoting their economic empowerment. The Covid-19 recovery process must have women, especially young women, as its priority. Jobs or income generation activities in low-carbon emission agricultural value chains represent a great opportunity for women.

1.3. Objectives

The main goal of this study is to understand PepsiCo's supply chain including the roles men and women have on-farm; perceptions of women in agro industry; barriers and opportunities women encounter in accessing the supply chain as direct suppliers, producers, or on-farm workers; and, access to technical assistance, technology, finance, and inputs needed to produce to PepsiCo's specifications. This information will inform the GDA to design and implement strategies to increase the number of women involved in PepsiCo's value chain, while promoting their empowerment and wellbeing. Specifically, it looks to:

- **Map the broader gender dynamics and agricultural context:** Identify factors related to the agricultural market, operating environment, and development priorities; climate vulnerabilities; and gender dynamics and structures, such as social norms, cultural practices, and laws related to property and business.
- **Identify gender risks and opportunities:** Understand PepsiCo's practices and current farmer engagement, behaviors, preferences, value chain constraints, and anticipated changes and any new programs or technologies.
- **Identify key opportunities to invest in farmers, farm workforce and farming communities:** Use a gender lens to de-risk the supply chain and enhance supplier operations to improve outcomes for women with both direct and indirect roles in PepsiCo.
- **Develop gender-responsive and gender-transformative action recommendations and identify intervention areas:** PepsiCo could pursue to close the existing gaps and expand gender equality, strengthen women's roles, and ensure a more sustainable value chain. In addition, it can propose strategies to mitigate unintended consequences of implementation and list potential intervention partners who represent farmer "enablers" (e.g. in extension services, input provisions, financial services, and rotation crop programs).

The first section of this report describes the potato value chain, women's roles, and the main challenges and opportunities that women face to access it. The third section follows the same content for the case of the plantain.

2. PEPSICO POTATO VALUE CHAIN, CHALLENGES AND OPPORTUNITIES FOR WOMEN

[24] Morrison, A.W., Orlando, B. *The costs and impacts of gender-based violence in developing countries: Methodological considerations and new evidence.* The World Bank working paper, 2004.

2.1. PepsiCo's Potato Supply Chain

The potato supply chain in Colombia is made up of nearly 100,000 producers on 35,035 productive agricultural units (*UPA* for its acronym in Spanish), of which only 18% are led by women. In 2020, 125,426 hectares (ha) were planted, with a production of 2,625,272 tons in the Andes' highlands, 37.5% in the department of Cundinamarca, 29.5% in Boyacá, 19.3% in Nariño and 5.3% in Antioquia. The potato crop usually rotates with other crops such as barley, pasture for cattle, and vegetables. In Colombia, potato production is mostly small-scale since 98% of women producers and 85% of all producers cultivate less than 10 ha. Generally, productivity is low, which is reflected in low average yields of 20.9 tons per ha.

PepsiCo buys 3% of all potatoes in Colombia (80,000 tons per year), particularly from large producers that can fulfill PepsiCo's high efficiency requirements in Boyacá, Antioquia, Cundinamarca, and Nariño. Currently, PepsiCo has 81 contract suppliers and each one cultivates an average of 987 tons/year on an average farm size of 24.6 ha. Interviews revealed that PepsiCo works mostly with producers that cultivate more than 10 ha, and its preference is to work with suppliers with greater production efficiency.

PepsiCo supplies their three plants for the production of potato chips under the brands *Papas Margarita* and *De Todito*. The industrial plants are located in Funza (Cundinamarca), Bogotá (Cundinamarca), and Sabaneta (Antioquia). To supply the processing plants, PepsiCo has an agricultural unit located in Funza that receives, selects, and distributes potatoes to the processing plants. PepsiCo requires freshly harvested potatoes that have not been stored, for chips production.

PepsiCo requires high technical, quality, and efficiency standards, and works with the largest producers in Boyacá, Cundinamarca, and Nariño providing them certified seeds. A review of PepsiCo's supply chain shows that its potato suppliers in Colombia represent a group of elite farmers who are different from the average Colombian potato producer in size, technology use, access to financing, and efficiency.

- Out of the current 81 PepsiCo suppliers, 65.4% are men with individual contracts; 13.6% are women and 17.3% are companies, whose ownership cannot be established from administrative records.[25] Only 3.7% of PepsiCo's supply comes from associations. Two of the associations are led by women: ASOAGROTOCA, comprising 23 smallholder women producers; and ASORQUIDEA comprising 21 families (17 female and four male producers). These two associations have received intensive capacity strengthening support from The PepsiCo Foundation (see Box 1).
- Women are mostly absent from PepsiCo's potato supply chain. While the previously mentioned barriers affect women in the production of agricultural products, some barriers are driven by PepsiCo's purchasing preferences, and others by the ecosystem further detailed in section 2.3.
- Most of the 81 producers are located in the four main potato-producing regions of Colombia - 39.5% from Cundinamarca, 34.6% from Boyacá, 19.8% from Nariño, and 6.2% from Antioquia - located in proximity to a processing plant.

Figure 1, shows a summary of the main characteristics of PepsiCo's producers and Table 1, shows the composition by gender and place of origin.

[25] In Colombia, the concept of "women-owned business" is not yet widely known and therefore not measured like in the United States. The gender of the legal representative of the firm is often the only information available. Administrative records received only include the name of the company.

Figure 1. PepsiCo Potato Supply Chain in Colombia

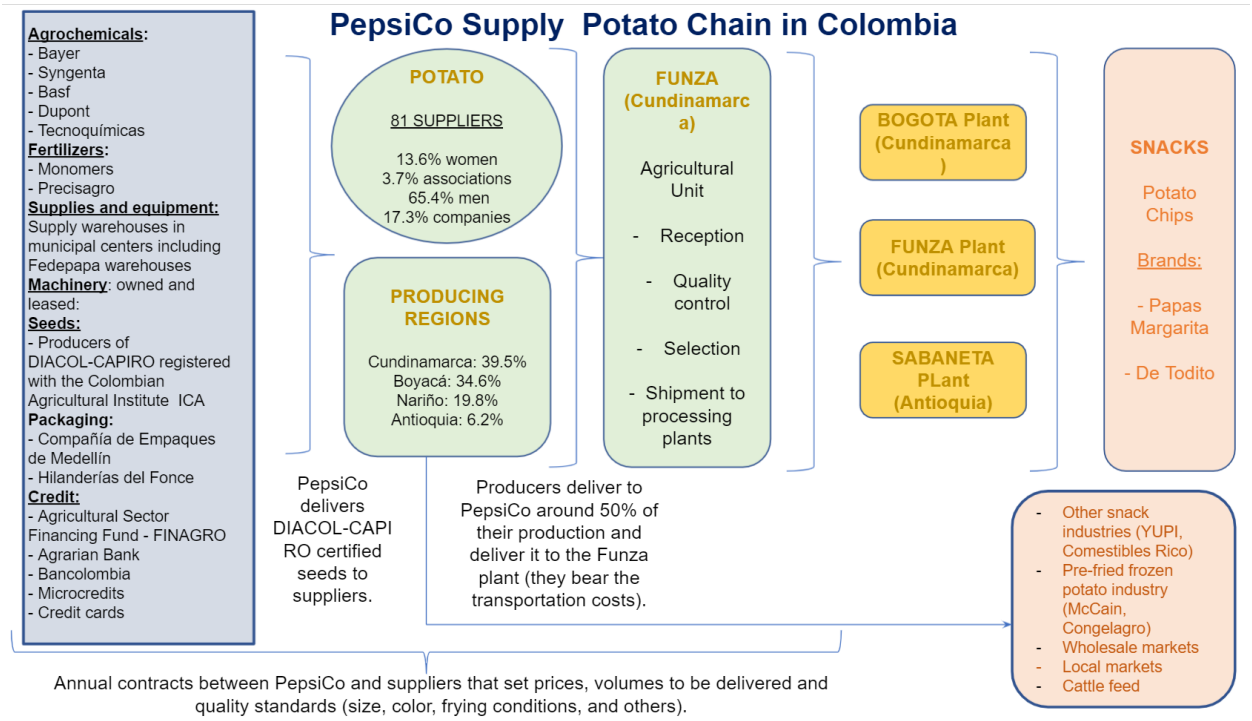


Table 1. PepsiCo's Potato producers by region

Potato	Boyacá	Cundinamarca	Nariño	Antioquia	Total	Percentage
Men	16	21	14	2	53	65.4%
Women	4	6	1	0	11	13.6%
Companies	6	5	1	2	14	17.3%
Associations*	2	0	0	1	3	3.7%
Total	28	32	16	5	81	100%
Percentage	34.6%	39.5%	18.8%	6.2%	100%	

Source: Author's own elaboration based on PepsiCo's information.
ASOAGROTOCA: 23 women. ASORQUÍDEA: 17 women and four men.

2.1.1. Inputs

Variety: PepsiCo uses the non-proprietary DIACOL-CAPIRO seed variety (also known as R12) for its physical-chemical conditions that allow the optimal size (5-10 cm diameter), color, flavor, and frying conditions (sugar and starch content and lower oil consumption) for the production of potato chips. PepsiCo aims to introduce three new kinds of potatoes in the next five years (so far, attempts to introduce new varieties have not been successful).

Type of financing: The potato producers who sell to PepsiCo are financed by bank loans, credit cards, or their own resources. Some PepsiCo producers assure their credit with the contracts they have signed with PepsiCo. They also take supplier credit. Both men and women producers may receive financing from the company.

Type of labor hired and contracts: Potato cultivation requires skilled (tractor drivers and machinists) and unskilled labor for planting, spraying, weeding, and harvesting.

- Large producers hire one man (*capataz*) that brings his crew (*cuadrilla*), whose pay may or may not include food, to the crop field. Large producers can hire up to 150-200 weekly workers. Workers are paid per activity; activities requiring physical strength are paid more.
- Most workers have informal jobs (*jornaleros*) that are paid per day and/or activity. Payments per day vary between US$10 and US$14 depending on the activity and the region.
- Women's participation as workers in cultivation is very low. Their participation is mainly limited to the preparation of food for workers and administrative activities.

Seeds: PepsiCo delivers the certified DIACOL-CAPIRO potato seed variety to producers that sign contracts with them. This certified seed is used by PepsiCo producers and registered with the Colombian Agricultural Institute (*ICA*), which certifies the quality of the seed and its resistance to pests and diseases. The cost of the seed is discounted from the raw material delivered by the producers to PepsiCo in fulfillment of the contract.

Contracts with PepsiCo: Producers sign a yearly contract with PepsiCo, which guarantees the purchase of its production at a fixed price. The minimum quantity that PepsiCo contracts with a supplier is 300 tons/year. Hence, the smallest producers require around 10 ha to meet contract commitments. It is common for women smallholder producers with an average of three hectares to be members of associations that supply PepsiCo on an aggregate of 63 to 69 ha.[26]

Prices: Prices are based on the average price of DIACOL-CAPIRO variety suppliers, cost of optimal crop management, and a 17% producer profit. Contracts are not made for 100% of production, but for around 50%. Accordingly, producers deliver the higher quality potatoes to PepsiCo and the rest are sold to other industries and markets. While this system protects producers from low prices, it can risk the company's supply when potato prices skyrocket. Evidence from interviews suggest that small producers are more likely to default on their contracts when prices go up. On the contrary, when there is a shortage of potatoes, the interviewees confirmed that PepsiCo is stricter when doing random product quality checks upon receipt and may return the merchandise. Since quality control is conducted at the plant reception, the load is rejected and sent back if the samples are not satisfactory with the farmer assuming transportation costs. When rejected, the product is sold in local markets at a lower cost.

2.1.2. Potato Production Process

Production efficiency: With good crop management and irrigation, the DIACOL-CAPIRO variety has the potential to produce up to 60 tons/ha. PepsiCo's producers obtain an average of 40 to 50 tons/ha; more than double the national average of 20.9. Notwithstanding, this variety requires greater applications of fertilizers and agro-chemicals due to its high susceptibility to pests and diseases. Consequently, production costs for PepsiCo's growers are almost double that of average growers (US$7,000 vs.

[26] This is an approximate number based on each producer having on average 3 ha. Asogrotoca has 23 producers and Asorquidea 21. Following data from the Agricultural Census, 63.7% of female potato producers in Colombia are landowners and 9.3% rent their lands.

US$4,300/ha). Since a PepsiCo producer has a minimum of 10 ha and requires at least an investment of US$70,000, the producer must have considerable capital derived from its own resources and/or from bank and supplier loans.

Irrigation systems: In Colombia, potato growers generally have little access to irrigation systems and depend mostly on rain. This can make potato farming a high-risk investment due to persistent drought and climate change. However, some large producers, many are PepsiCo suppliers, have access to irrigation systems because they have the capital that allows them to access adequate land with existing irrigation systems. These lands are more expensive to rent and require an investment of US$5,500/ha. Indeed, the *CNA* suggests that only 32.4% of potato producers and 50.3% of potato producers with more than 10 ha have irrigation systems. Irrigation systems allow producers to have two harvests per year instead of one. There are no women involved in this activity.

Harvest: Since PepsiCo's producers sell to other companies as well, producers separate the harvest into four categories: a) ZERO quality, large, sold to the frozen pre-fried potato industry (McCain and Congelagro); b) FIRST quality, sold to the potato chip production industry (PepsiCo, Comestibles Rico and YUPI); c) *PAREJA* quality of smaller size, sold fresh in markets (central supply stores, village markets and supermarkets, and large stores); and d) *RICHE* quality of small size left for the consumption of livestock, an activity with which potato cultivation is rotated.

Delivery process: Transportation costs are included in the contract price for PepsiCo's suppliers from Cundinamarca, Boyacá, and Nariño. Suppliers are responsible for delivering the product to the Funza Agricultural Unit, located approximately 40 minutes from Bogotá. Suppliers from Antioquia deliver products to the Sabaneta plant. If the product from Antioquia is insufficient, product must be carried from Nariño or the Funza Agricultural Unit to the Sabaneta plant. Transporting a kilo of potato from Cundinamarca or Boyacá to the Agricultural Unit in Funza costs around 1.3 cents per US dollar. A kilo of potatoes travelling the longest journey from Nariño to Antioquia to the Sabaneta plant costs 4.1 cents per US dollar. The reception of the product in the Funza and Sabaneta plants requires the company to perform quality controls in terms of size, defects, sensory and frying qualities. For this, several crates are selected at the entrance to which the tests are conducted. If the contents do not meet PepsiCo's technical and quality requirements, the product is not accepted, and the producer loses the cost of transportation. When this happens, the product immediately loses value.

When trying to understand PepsiCo's value chain, it is important to recognize that several production systems coexist. For example, while some producers work the land with machinery, others use manual techniques or animal traction (horses in Boyacá). This is why, to improve efficiency and gender equality, the GDA must consider these different systems across farms.

2.1.3. Potato: Technical Assistance

Technical assistance: Overall, PepsiCo does not provide technical assistance to its producers because most are experienced large-scale growers. It provides support when issues arise and maintains the Sustainable Farming Program (SFP) certification. The PepsiCo Foundation provides technical assistance to two female-led associations in Boyacá (see Box 1) and FEDEPAPA gives technical assistance to small and mid-size producers that are mostly outside of PesiCo's value chain.

- Large producers use part of their budget to pay for technical assistance from private agronomists and input providers.

- PepsiCo's agronomy work is limited to providing certified seeds, defining quality standards, and identifying new good practices in other countries, especially mechanization.
- PepsiCo's producers are monitored by the company, but do not receive technical assistance. Monitoring is done by PepsiCo's agronomists and consists of a report on the probability that the producers will comply with the volumes and quality standards agreed in the contract. Agronomists act as judges that evaluate the product and determine the standards required to receive remuneration.
- The PepsiCo agronomy team can suggest actions to producers, but cannot directly interfere with the crop.
- PepsiCo supports the attainment of the Sustainable Farm Program (SFP) certification for growers.

Associations strengthening: The PepsiCo Foundation has been working for over five years in the incorporation and consolidation of two women-led associations: ASOAGROTOCA and ASORQUIDEA. The program called Women, Water and Reconciliation (*Mujeres, Agua y Reconciliación*) aims to improve water use and inclusion of women in PepsiCo's value chain. Due to previous unpleasant experiences with failed association initiatives and poor results with Bavaria, local women were not interested in starting associations. The program was supposed to last three months and found that it needed to first build trust with women and help build their technical and managerial capacity to succeed (See Box 1 for more details).

The capacity training this association received included:

- Formally incorporating the association
- Conflict resolution and trust-building
- Technical skills improvement (how to cultivate potato in a more efficient way by following PepsiCo's standards)
- Leadership and social-emotional skills building and strengthening
- Support with land acquisition (the association bought additional land to increase their supply to PepsiCo)

Box 1. The Case of Strengthening Women's Associations by the PepsiCo Foundation

The PepsiCo Foundation started a program in 2017 called *Mujeres, Agua y Reconciliación* (Women, Water and Reconciliation) that was implemented by *Reconciliación Colombia*. The aim was to improve water use and inclusion of women in PepsiCo's value chain. The first female-led association composed of 17 women and their families, ASOGROTOCA, was created after one year. It took another two for them to become suppliers of PepsiCo. Conversely, the capacity strengthening of ASORQUIDEA took one year to become a PepsiCo supplier (constituted by the end of 2020), fewer invested resources, and less training and monitoring. This is because ASORQUIDEA's leader had previous managerial and commercialization experience with potato crops, and strong leadership skills to mobilize the members of the association.

Takeaways for future female associative processes:

- Building trust at an early stage between women and PepsiCo is critical.
- Assess and select female associations that already have experience with crop production and have followed other capacity building/strengthening exercises (ex. with FEDEPAPA) to succeed faster.
- Identify strong leadership within the association and nurture those leadership skills at an early stage.
- Assess and strengthen social-emotional and business skills, technical knowledge, irrigation systems, and the perception of associating.
- Involve families and husbands. Women with the greatest success within the associations had their husband's full support, worked together with their husbands, or were head of household.

- Working through an existing association is recommended since it can take several years for associations to become suppliers to PepsiCo.

2.2. Potato: PepsiCo's Main Supply Chain Challenges

Climate change, lack of generational renewal, land efficiency, and production in Antioquia are important challenges PepsiCo faces and that will intensify in the near future.

Current difficulties with the supply for Guarne (Antioquia): Perhaps one of PepsiCo's greatest mid- and long-term challenges is to supply the new plant under construction in Guarne (Antioquia). According to information from the interviews, this will be the largest PepsiCo plant in Colombia. However, representing 5% of total volume, Antioquia is the department with the lowest production in PepsiCo's potato supply chain. Indeed, Antioquia has the lowest level of potato production nationally at 5.3%. In addition, potato production costs in Antioquia are higher than the average cost of the company's suppliers.[27] Indeed, the cost of producing PepsiCo's potatoes in Antioquia reaches US$7,900/ha, compared to US$7,000 in Cundinamarca, Boyacá, and Nariño. If current producers were to send their production to Antioquia, transportation prices could soar. For example, transportation costs from Nariño to Antioquia are up to four times greater than those from Cundinamarca and Boyacá to Funza.

Lack of generational renewal: In general, the rural sector faces the challenge of achieving generational renewal. Young people want to move to the city and do not want to work in the fields. PepsiCo is concerned that its farmers are aging, and their children are not involved in the parents' activities. In 10 to 20 years, PepsiCo may not be able to source from existing farms.

Price fluctuations: Potato prices in Colombia have high volatility, variability, and seasonality. This is partly explained by the fact that producers don't usually have access to advanced technology or to irrigation systems. High price volatility means that PepsiCo has supply risks when market prices rise above established contract prices.

Climate change: One of the requirements for growing potatoes is water availability. In the potato-producing areas of Colombia, a variation in the rainfall system caused by climate change has been observed with very few farms having irrigation systems. If this change translates into widespread drought, it will affect PepsiCo's potato supply in the medium term.

Urbanization is increasing land prices: As a consequence of the COVID-19 pandemic, rural areas are urbanizing quickly. Particularly in districts close to Bogotá like Cundinamarca and Boyacá, there is greater demand for land, causing prices to rise. As a result, there is increasingly less land availability and more pressure to improve land-use efficiency to increase potato production.

2.3. Women's Participation in PepsiCo Potato Supply Chain: Barriers and Opportunities

2.3.1. Women's Participation in PepsiCo Potato Supply Chain

Only 13.6% (11/81) of lead potato producers (direct contract holders) are female. It is estimated that less than 10% of workers are female, and they are concentrated in administrative tasks and cooking duties for workers on large farms. Two women's associations in Boyacá (ASOAGROTOCA and ASORQUIDEA) that

[27] The interviews did not provide information to understand why this is the case.

were created partly as a result of an effort made by the PepsiCo Foundation, currently represent 3.7% of the overall supply. Both associations are female-led and they are composed mainly of women small producers (See Box 1). On average, women's roles in overall production - planting, maintaining, harvesting, and selecting - is very limited. This can be explained by cultural norms and the fact that most activities require physical strength because small farmers lack the technology to automate procedures. In addition, more laborers are being hired due to lack of mechanization. Women's duties in the supply chain are grouped as follows:

Logistical and administrative tasks:

- Recording expenses, processing loans, purchasing supplies, and hiring workers.
- On small farms, the wives of producers sometimes perform these tasks. There is a consensus among male producers that women are more organized and meticulous than men in administrative tasks.

Food preparation for workers:

- Women prepare the food for workers, particularly during harvest.
- Among small producers, this work is often performed by their wives. Among large producers, women are hired to cook.

Technical assistance and research:

- Women technicians and agronomists offer technical assistance and are generally accepted by producers. For example, the FEDEPAPA team of technicians and agronomists who offer technical assistance to 15,000 small potato producers in Colombia is made up of 30 professionals. Of these, 50% are women, with very good acceptance from producers.

Potato rotation activities:

- The potato crop is principally rotated with pastures for dairy cattle in Colombia. Women are often involved in feeding the animals, milking and planting barley.

Field workforce:

- Women are mostly absent from all stages from preparing the soil to harvesting and packaging.
- In some cases, women come with their families as laborers.
- Women in Nariño tend to be more involved than women in Boyacá and Cundinamarca.
- When women come with their families, producers notice cases of domestic violence.

2.3.2. General Barriers to a Greater Women Participation in PepsiCo's Potato Value Chain

Potato production is traditionally a male-dominated sector due to cultural and social norms, and the required strength for heavy work in the absence of machinery. Gender roles in the PepsiCo potato supply chain correspond to a variety of factors from cultural and historical processes[28]; and also PepsiCo's purchase requirements which are easier for large producers to achieve.

In Colombia, women are less likely to access and manage land. Additionally, displacement due to armed conflict, a historical issue, has severely disadvantaged women. The main avenue for women smallholder farmers to access land is through creating or strengthening producer associations. Their limited access to

[28] Mentions to cultural and social norms barriers come from a variety of sources: interviews, focus groups, expert-led interviews, and desk review.

land also affects their access to credit due to a lack of collateral. Evidence from some interviews with lead experts and female producers pointed out that in many cases, even when women do receive credit, their partners control it.

During the interviews with agricultural experts, it was evident that women are less likely to decide what to plant where or how if they do not own the land and their partner is in charge of the land crop production. This is consistent with the literature.

Unpaid care work: Women have less time to lead agricultural activities, attend trainings, participate in business matchmaking, or leave their farms for commercial activities. The time scarcity women face worsened with the closure of schools and daycares due to COVID-19 restrictions, and the lack of digital inclusion of rural women.

Lack of digital inclusion and digital skills: The global pandemic further revealed the digital gap women experience. As more services and transactions remain online, it is difficult for women to access information, participate in online trainings, or connect with buyers directly. Low-income women have smartphones, but no access to computers or to unlimited data on their cell phones and/or WiFi at home. Many large buyers, business associations, and USAID-supported programs, pivoted technical information and assistance to online platforms which many women are unable to access.

Geography and location: Interviews revealed that there are significant local differences between female and male producers. Regional social and cultural norms affect women's involvement in the production, harvesting, and post-harvesting processes. For example, while women in Nariño tend to perform most of the activities in the value chain and hire workers or work with family members for activities requiring extreme physical strength, in Cundinamarca, they are for the most part absent. In Boyacá, women have a more significant role in the value chain—particularly in irrigation, fumigation, and product selection during the harvest—than their neighbors in Cundinamarca. No specific references were made for the case of female producers in Antioquia.[29] Table A, in Appendix 6 summarizes the gender roles by task in PepsiCo's potato value chain.

2.3.3. PepsiCo's Potato Supplier Requirements

According to interviews with PepsiCo's Colombia agronomy team, planting one hectare of potatoes requires about US$7,000 and currently entails a significant risk due to drought. PepsiCo requires that producers have a minimum of 10 ha, which requires about US$70,000 in early investment. Before becoming suppliers to PepsiCo and strengthening their capacity for three years with the PepsiCo Foundation, ASOAGROTOCA households earned on average US$200 per month. Female-led producers revealed a series of barriers to become PepsiCo's supplier:

Production capacity: PepsiCo prefers to work only with large producers, which can make it more difficult to include female producers that on average have less land, fewer financial resources, less access to credits, and risk adversity. PepsiCo prefers to work with larger suppliers because they have more efficient processes and use of resources, greater technical knowledge, and higher capacity to respond to quality standards. For PepsiCo, this means having less suppliers and therefore less administrative and logistical issues.

[29] Antioquia was excluded during field work planning. Expert interviewers such as the Ministry of Agriculture, FEDEPAPA, and the National University did not know or mention specifics about cultural and gender differences in Antioquia.

Quality control: Women interviewed mentioned a lack of clarity and understanding regarding potato acceptance requirements. Each trip taken to transport potatoes from Boyacá to Bogotá can cost US$400 (COL$1.5 million), and often the product is rejected in what producers often determine as an "unfair" or "unclear" process.

> "They returned a truck I sent… they accept [loads] with a maximum of 5% with defects and I got 5.03. That was nothing; they returned it because of nothing and I had to take it to the town market to sell it…" (Woman Lead Farmer)

Other risks: The price volatility, frequent droughts compounded by the lack of irrigation systems, and the investment required to plant each hectare (US$7,000) can deter women and small producers from becoming suppliers to PepsiCo. As PepsiCo builds its new plant in Antioquia (Guarne), the need for greater supply grows. The plant construction will take three years and PepsiCo is currently exploring solutions to increase the potato supply nearby.

Variety: Working only with the DIACOL-CAPIRO variety challenges expansion into Antioquia due to the fact that it costs almost twice as much as other varieties. Though PepsiCo is exploring new varieties, due to the registration process, they may not be available for several years. At the same time, the technical and quality requirements of adopting a new variety can be a learning curve for smallholder producers.

Land use efficiency: Current suppliers must increase their production capacity in the near future. This represents a barrier for smaller producers, where women are more represented.

Land availability near the new plant in Antioquia: PepsiCo must identify suitable land for potato production near the town of Guarne. This region has high urban pressure and land prices due to its proximity to Medellín. In addition, there are not as many potato producers in Antioquia as there are in Boyacá, Nariño, and Cundinamarca and potato production in this region is just 6.2%.

Irrigation systems: With the support of FEDEPAPA, ASOAGROTOCA started some drip irrigation demonstration plots, where they are managing to cultivate twice as much on the same amount of land. Thanks to this technique, ASOAGROTOCA managed to grow 60 tons/ha, compared to the PepsiCo producer average of 50 tons/ha, and the national average of 20 tons/ha.

2.3.4. Existing Barriers: Supplier Perspective

In addition to the aforementioned disparities in land access, inputs, and financing, other supply-side factors affect the likelihood of women joining PepsiCo's value chain. While some of these are structural (only government macro interventions or generational change would allow some sustainable change), some have been successfully addressed by The PepsiCo Foundation.

- **Lack of trust and fear of collective work:** In the case of ASOGROTOCA, families lacked trust in PepsiCo and the private sector generally due to previous negative experiences in associations (such as with Bavaria). Unlike other regions in Colombia, initiatives with associations in Boyacá have failed (See Box 1).
- **Lack of exposure to markets and commercial skills**: Due to less exposure to markets and farm work outside their family units, women are less likely to have the necessary skills to start or grow

a business or an association. Often, domestic partners do not allow their wives to travel or attend training and commercial activities.

- **Lack of experience managing potato crops:** Managing potato crops for women is harder since men have had more access to markets and experience with the product. The PepsiCo Foundation had to create an association (ASOAGROTOCA) from scratch, due to the lack of women producer potato associations. This process took about five years; three years of capacity building until ASOAGROTOCA could become a supplier, and two years to increase their production to a meaningful level (from 250 to 1500 tons).
- **Traditional gender roles and leadership skills:** Due to care activities, traditional social norms, the "masculinization" of the plantain and potato value chains, few women lead the way in these areas. Developing leadership skills and motivation can be a costly and time-consuming process (e.g. ASOAGROTOCA).
- **Lack of capacity:** The process of creating the Association and developing or strengthening their capacity took longer than expected. In part due to the aforementioned barriers.

2.3.5. Exclusionary Behaviors and Unconscious Bias within the Ecosystem

In addition to the barriers women face from the supply and demand sides, there are existing barriers in the potato ecosystem. Those include sexual harassment, bias and discrimination, and technical assistance that does not consider the differential needs of women.

Women have less access to finance due to lower access to collaterals, but also due to bias from financial organizations. Loans given by government initiatives such as *Mujer Rural* are insufficient to provide a real chance for women to participate in PepsiCo's value chain. Today, thanks to the work done with the PepsiCo Foundation, ASOAGROTOCA female producers have access to credits, resolving credits and preferential conditions, with the Agrarian Bank and *Mujer Rural*.

Bias and discrimination in commercial environments: Women from associations reported having suffered from bias and discrimination in commercial environments, describing them as very chauvinistic.

> "It still happens to me. I tell my brother to go to the town's market and sell, because the market leaders are not going to pay any attention to me." (Association leader).

Technical assistance: They report that the way women farmers use technical assistance (ex. from FEDEPAPA) does not consider women's differential needs, schedules, care responsibilities, or jealous husbands. Indeed, schedules and bias from technical assistance providers hinders women's participation and learning process.

Sexual harassment: During the interviews, a female producer reported that sexual harassment is rampant in Colombia. The producer mentioned encountering harassment in the street, on transportation, and in training and business settings.

Other forms of gender-based violence occurring in private: Focus groups evidenced cases of domestic violence among laborers' families. Some women even come to work with signs of abuse. Gender-based violence can affect women's work productivity and earnings, and even farm production goals.

Traditional gender roles: Lead-producers' wives report disliking having women working in their farms, due to an increase in affairs, which created domestic struggles. These situations presumably do not occur when women work with their families.

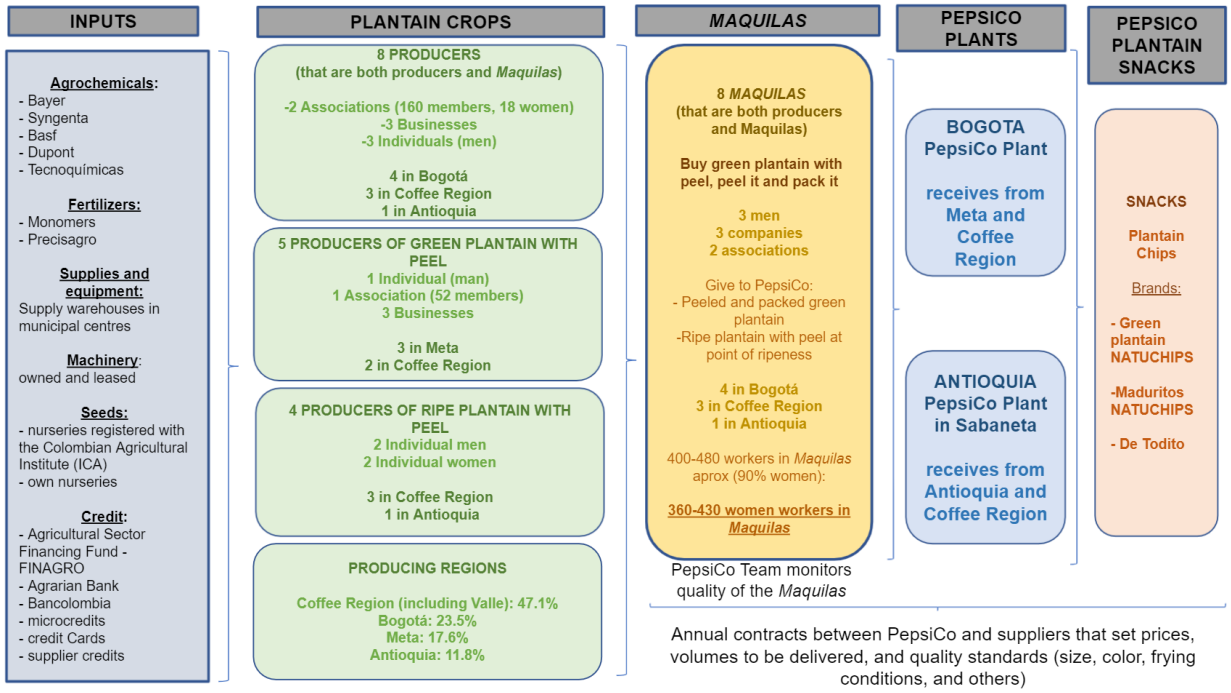
In addition to supply and demand, it is key to work on changing the ecosystem's context. Changing cultural norms that penalize women for navigating a traditionally male dominated sector can be one of the most important barriers to dismantle. Sexual harassment, bullying, and bias against women reduces the chances of creating more opportunities for women. Technical assistance from FEDEPAPA and PepsiCo must be aware and trained to integrate women's differential needs. The recommendations to address these barriers are discussed in section 4.

3. PEPSICO PLANTAIN SUPPLY CHAIN, CHALLENGES AND OPPORTUNITIES FOR WOMEN

3.1. PepsiCo's Plantain Supply Chain

PepsiCo purchases 29,000 tons of plantain; 24,000 are green and 5,000 are ripe. This is less than 1% of the plantain grown in Colombia. PepsiCo processes green plantain slices and ripe plantain slices sold under the brands *NatuChips Plátano Verde* (green plantain) and *NatuChips Maduritos* (ripe plantain). The green plantain slices are also included in the *De Todito* brand mix. The processing plants are located in the industrial zone of Bogotá, which receives raw material from Meta and the Coffee Region, and in Sabaneta (Antioquia), which receives raw material from all over Antioquia and the Coffee Region. Currently, the Funza plant does not process plantain. The *Maquilas* receive plantain from the owners of the *Maquilas* who also grow plantain and from other producers.

Figure 2. PepsiCo's Plantain Supply Chain in Colombia



Source: Author's elaboration based on interviews, focus groups, and administrative records.

The raw material received by PepsiCo plants for processing are: 1) green plantain peeled and packaged in 24-kilogram bags and 2) ripe plantain with peel at the right ripening point. These raw materials are processed in the *Maquilas*, which receive the unpeeled green plantain to peel and pack it, and the ripe plantain to put in ripening cellars. Since the peeled green plantain quickly oxidizes into a blackish color and continues to ripen after peeling, no more than 16 hours can pass between the moment of peel removal and the moment the plantain is sliced. This implies a time-constraining process that requires *Maquilas* to be located close to PepsiCo plants. For this reason, six of the ten *Maquilas* are in Bogotá, three in the Coffee Region, and only one in Antioquia (Sabaneta). The *Maquilas* hire an average of 50-60 people as peelers, of which 90% are women. Thus, the *Maquilas* as a whole hire 400-480 people, of which 360-480 are women.

Table 2. Destination and transport times of the *Maquilas´* products*

PRODUCERS	REGION OF PLANTAIN CROPS	*MAQUILA* LOCATION	DESTINATION OF PEELED PLANTAIN	AVERAGE DISTANCE FROM *MAQUILA* TO PEPSICO PLANT **
Unknown	Meta	Bogotá: Company	Bogotá PepsiCo Plant	40-60 minutes
	Coffee Region			
Unknown	Meta	Bogotá: Company	Bogotá PepsiCo Plant	40-60 minutes
	Coffee Region			
Unknown	Meta	Bogotá: Man	Bogotá PepsiCo Plant	40-60 minutes
	Coffee Region			
Unknown	Meta	Bogotá: Man	Bogotá PepsiCo Plant	40-60 minutes
	Coffee Region			
Association with 60 members	Coffee Region	Coffee Region (Belen de Umbria)	Bogotá PepsiCo Plant	8 hours
			Antioquia PepsiCo Plant	5 hours
Unknown	Coffee Region	Coffee Region (Armenia)	Bogotá PepsiCo Plant	6 hours
			Antioquia PepsiCo Plant	5.5 hours
Association with 100 members	Coffee Region	Coffee Region (Argelia)	Bogotá PepsiCo Plant	8.5 hours
			Antioquia PepsiCo Plant	6 hours
Unknown	Antioquia	Antioquia (Sabaneta)	Antioquia PepsiCo Plant	40-60 minutes
	Coffee Region			

*Note that this table shows 8 total Maquilas, four of which are in Bogata. After an analysis of this assessment was completed, a conversation with the PepsiCo local agronomy team revealed that two additional Maquilas exist in Bogata, bringing the total number of Maquilas to 10. Implementation planning will take into consideration all ten Maquilas.
**Source: Author's elaboration based on interviews, focus groups ,and administrative records. Average distance calculated with Google Maps.

The *Maquilas* buy unpeeled plantain from five contract holders; one association of 52 members, four producers of ripe plantain with peel, and eight producers of peeled green plantain simultaneously cultivate green plantain and have *Maquilas*. Of the eight producers of peeled green plantain, two are associations with 160 members each, of which 18 are women. Including the members of the

associations, there are 226 producers, of which 20 are women (8.8%). Of the 20 women, 18 belong to associations and two are producers that have contracts with PepsiCo.

In Meta, there are three large producers of unpeeled green plantain who are legally incorporated businesses. These producers deliver unpeeled green plantain to *Maquilas* in Bogotá, some of which they also own, as inferred from the interviews and focus groups. The reason they bring the green plantain with peel to Bogotá is to meet PepsiCo's technical requirements (peeling time and ripening point). While Villavicencio, the capital of Meta is two hours from Bogotá, the farms are two-three hours from Villavicencio and five-six hours to Bogotá. This can be more depending on road conditions.

Unlike potato, plantain has a long dependence on associations characterized by small farms that cultivate less than three ha. This is also reflected in PepsiCo's supply chain; three plantain associations comprised of 212 small producers, including 18 woman-owned small farms.

- While the two potato associations cultivate less than 3.7% of PepsiCo's supply, plantain associations cultivate 20%.
- There are only two female-led producers with direct contracts with PepsiCo for ripe plantain.
- While female-led potato associations were incubated and strongly supported by The PepsiCo Foundation, they did not need much support. This is due to a long history operating as an association through their relationships with the Federation of Coffee Growers and *Alianzas Productivas*[30] among others.
- The 212 producers who are part of the three associations of small farmers plant on average less than 3 ha.
- In general, they plant other crops such as coffee and cocoa in a classic rural family economy system.
- Large plantain producers, which are suppliers to PepsiCo, cultivate more than 10 ha while only 4.3% of plantain producers in Colombia cultivate more than 10 ha overall. These are mostly monocultures.

3.1.1. Inputs

Variety: Among the many plantain varieties, PepsiCo requires *Dominico Harton* which is commonly used for industrial processing. This variety is cultivated in the Eastern Colombian Plains, where the department of Meta is located, as well as the Coffee Region and Antioquia.

Financing: Small and large producers in all regions use credits from FINAGRO and the Agrarian Bank, *cupos*[31] from the commercial houses, and credit cards for small purchases. Women interviewed did not perceive discrimination in accessing loans. Rather, they explained the gender credit gap with the gender land ownership gap.

Labor: Most laborers are paid a daily wage of US$10-14 according to the activity and region (*jornaleros*). Small producers from associations carry out the cultivation work with their own labor, family labor, and *jornaleros* for some activities. Large producers in Meta and the Coffee Region hire contractors that come with their own workers. In this case, there is a contract between the farm owner and the contractor, and

[30] *Alianzas Productivas* are agreements that seek to link small organized producers with the private sector to carry out medium and long term projects. There have been multiple government efforts to support *Alianzas Productivas*, the most recent being *Alianzas Productivas Para la Vida 2020.*

[31] Loans of products based on trust.

another contract between the contractor and his workers. Integrating women into field work would require working with the contractors since they make the decisions regarding the workforce.

Supplies: PepsiCo plantain contract holders who are association members obtain agrochemicals, fertilizers, and equipment from warehouses or agricultural commodity companies located in the headquarters of plantain producing municipalities. It is also common for producer associations to have warehouses for supplies for their associates and buy some or all of their inputs from the association at lower prices. Large producers, like those in Meta, can also go directly to production companies (Syngenta, Basf, Dupont, Bayer, Tecnoquimicas, Monomeros, Precisagro, among others). Most of the sales personnel of these products are women which is unsurprising in rural areas where women are more likely to receive income from service jobs than from agriculture.

Land: The majority of PepsiCo plantain producers (69.7%) are landowners. According to the CNA, 56.3% of producers that cultivate less than 3 ha are landowners indicating that smallholder association members from whom PepsiCo sources are in this category. Large plantain producers also tend to lease land; according to the CNA, only 39.5% are landowners. The interviews and focus groups corroborate that large producers both own and lease land for plantain production.

3.1.2. Plantain Production to Post-Harvest Process

Propagation: Although there are several methods of plantain propagation, it is common to use the reproduction of corms in farm nurseries (in the case of large producers) or associations (in the case of small producers), to reduce the risks of disease spread and increase the productive potential of the plant. The raw material of the plantain is reproduced through corms grown in seedbeds, until plants of approximately 15 cm, called *cormos*, are obtained. Plantain *cormos* for sowing can be purchased in nurseries certified by the Colombian Agricultural Institute (*ICA*) or extracted from the parent plant with an adequate selection process. Women's roles in this stage includes spreading, disinfection, and maintenance of seedbeds and nurseries. In the case of Granada (Meta), the women clean, disinfect, and propagate *cormos*. Across the country, it is also common for women to work in seedbeds. While there are multiple ways to plant the plantain, it is common to plant nursery-grown *cormos* in the field.

The overall plantain propagation process by large producers is done almost entirely by men. Individuals interviewed attributed this to the physical strength required to do most tasks. It is important to consider that these farms have very few to no mechanized production. Women are mostly involved in cooking during harvest periods when the farms are full of workers, and they also tend to be involved in administrative tasks (more details in section 2).

Corms are removed by machete. Small producers do the pruning (*deshoje)* manually with the support of day laborers. Large producers hire contractors who lead their crews of workers. These activities are traditionally carried out by men. Some preventive measures are taken to efficiently fight diseases. Among them are good drainage, to avoid waterlogging; efficient weed control; adequate planting densities; suitable sucker selection and leaf removal practices; and, agrochemical application. In addition, to prevent insect damage, it is common for plantain bunches to be covered by bags until harvest. Small producers carry out these activities manually with the support of day laborers. Large producers hire contractors who lead their crews of male workers.

Harvesting: For the harvest, bunches are sorted by age with colored ribbons. To harvest the fruit when ripe, the bunches are cut over several weeks depending on the color of the ribbons. Smallholder producers carry out these activities manually with the support of day laborers. Large producers hire

contractors who lead their crews of workers. These activities are traditionally carried out by men, with low participation of women attributed to the large size and weight of the plantain bunches.

Processing: Once the bunches are harvested, they are washed and the plantain is pulled. During this process, the large bunches are separated into small bunches of five plantains. Subsequently, the plantain is disinfected in tanks of a solution of water and chlorine, selected and packed in boxes (for export), in plastic baskets (for fresh market), or in sacks (for industry). The plantains for PepsiCo are packed in sacks. Some women participate in washing and disinfecting the plantains before sacking them to be sent to the *Maquilas*.

Crop management: Large producers manage their crops with the support of accountants, financial advisers, and business administrators. The assertion that women support administrative activities was reiterative, particularly in Meta. It is also common for women to be in charge of administrative matters in producer associations such as operations, logistics, accounting, and clerical work. Likewise, several interviews and focus groups with women mentioned that small producers do not record expenses and sales. It was also mentioned that wives from small farms could do more to keep farm records and support their husbands in administrative matters.

3.1.3. Plantain Peeling and Maquilas

Maquilas process plantain from their own farms or from other producers, and guarantee compliance with PepsiCo's technical and quality requirements. The *Maquilas* supplying PepsiCo are located mostly in Bogotá (6), but also in the Coffee Region (3) and in Antioquia (1). Of these, 37.5% are individually owned by men, 37.5% are registered companies, and 25% are associations. None of the registered *Maquilas* are owned by women. The producers deliver the unpeeled plantain to the *Maquilas* where it is sorted for several customers wanting peeled and unpeeled plantain. Some of Meta's large producers own both the farm and the *Maquilas*. Producers will transport plantain from Meta, where it is cultivated, to Bogotá where it is peeled. Once ready, the product needs to be delivered within 16 hours, or it goes black due to oxidation, which explains why Meta producers might prefer to have the *Maquila* in Bogotá, closer to PepsiCo and other clients.

- Eight *Maquilas* deliver peeled green plantain and unpeeled ripe plantain to PepsiCo. It is estimated that each *Maquila* hires around 50-60 peelers, totaling 400-480 peelers in PepsiCo's supply chain.
- Of the total number of peelers, 90% are women; that is to say that 360-430 women are hired by *Maquilas* for peeling. Most women peelers live and work in Bogotá or in semi-urban settings (*cabeceras municipales*) in the case of the Coffee Region.
- Peelers, who are mostly women, are to be paid by the kilo of plantain peeled. On average, however, they are only paid the minimum legal monthly wage.[32] When *Maquila* owners tried to establish a minimum wage, some women complained that it was not fair because some would peel more than others and felt they should be compensated for peeling more.
- A high participation of women in the administration (operation, logistics, accounting, hiring of personnel, management and monitoring of marketing contracts, etc.) of the *Maquila* was also evident.

[32] COL$908,526 or US$241.69 as of 2021, plus a transportation subsidy of COL$106,454 or US$27.6.

In cases where the *Maquilas* are unable to fulfill PepsiCo's contractual volume requirements, largely due to weather or price variation, the owners of the *Maquilas* buy plantains in the open market. It is estimated that 30% of plantain processed by PepsiCo is sourced from the open market.

Associations of *Maquilas*: Two of the eight *Maquilas* (25%) are owned by associations of plantain producers. They deliver the plantain with the technical characteristics required by PepsiCo and process it for various other markets. According to the interviews, there are around 160 members within the two associations that supply plantains to PepsiCo, of whom only 11.2% (18) are women. Although the associations are led by men, the interviews revealed that there are three women hired for administrative tasks (accounting, hiring of personnel, logistics, management and monitoring of marketing contracts, etc.).

Delivery/transportation process: Transportation has two phases. The first is the transportation of the plantain with peel from the farms to the *Maquilas*, which is done in 25-35 kilogram sacks[33]. The second phase is the transportation of the peeled plantain packed in plastic bags of approximately 24 kilograms to the PepsiCo plants. The plantain that arrives at PepsiCo plants must be recently peeled, since the peeled plantain oxidizes very quickly. Once peeled, the plantain should arrive at the PepsiCo plants within 16 hours in a "just on time" process. In addition, PepsiCo is not the only client, since they also deliver to restaurants and others. For these reasons, the *Maquilas* in Bogotá are very close to the processing plants, and not in Meta where the farms are located though a *Maquila* is under construction by one of PepsiCo's suppliers. The delivery process is done 100% by men, both from the farms to the *Maquilas*, and from the *Maquilas* to PepsiCo. Each sack averages 24 kilos, which they say is "too heavy for women". Indeed, the Ministry of Labor and Social Security's 2400 Resolution of 1979 establishes that in Colombia men cannot carry loads heavier than 25 kg and women cannot carry loads heavier than 12.5 kg, regardless of her body mass index.[34] It is interesting to note that in the case of *Maquilas* in Bogotá two women independently buy and commercialize plantain peel waste to feed cattle which involves driving trucks and lifting plantain sacks.[35]

Contracts with PepsiCo: PepsiCo signs annual contracts with the *Maquilas* to buy peeled and packed green plantain (from Meta) and ripe plantain with peel (the Coffee Region and Valle)[36]. Volumes and prices are agreed in the contract. In some contracts, specifically *open market contracts*, the volumes that must be delivered by the producers vary according to their capacity and their contracts.

PepsiCo's technical requirements: PepsiCo has requirements concerning the size, length, peel quality (no residue), pulp hardness, time from peeling, and degree of ripeness, which varies depending on whether it is green or ripe plantain (Brix value). It is important to measure the Brix values of green plantain because, once peeled, it continues to ripen; it is necessary that it reaches the plant at an optimal point for frying. The plantain is delivered in 24kg capacity perforated plastic bags.

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[33] The legal maximum weight someone can carry is 25 kilos. During a focus group, a lead producer suggested sacks could weigh up to 35 kilos. This could have been a miscalculation or a violation of Colombian regulation. It is important to check on the implementation of such regulations.

[34] Ministry of Labor and Social Security. *Resolución Número 02400 de 1979 (Mayo 22) Por la cual se establecen algunas disposiciones sobre vivienda, higiene y seguridad en los establecimientos de trabajo.* 1979. http://calisaludable.cali.gov.co/saludPublica/Estetica_belleza/Res_2400_1979.pdf

[35] It is important to note that this is technically not part of the PepsiCo supply chain but indirect income earning opportunities created by the producers. The same opportunity is being explored by *ASPLABEL.*

[36] PepsiCo buys the peeled green plantain, as it is very difficult to peel. On the contrary, the ripe plantain is bought with the peel because it is easier to peel, and then is taken to PepsiCo's plant to be peeled.

PepsiCo purchase prices: The purchase prices set in PepsiCo contracts are based on market prices, recorded by the Price and Market Information System (*SIPSA*), and an analysis of the costs borne by suppliers (inputs, labor, etc.). These prices are increased annually in accordance with the Consumer Price Index (*IPC*). Prices may vary from one contract to another, due to transport price differences. The prices paid to suppliers (*Maquilas*) are prices determined at the PepsiCo plant; that is, the producer assumes the transportation costs.

3.1.4. Technical Assistance

Technical assistance: Overall, PepsiCo does not provide technical assistance to plantain producers and associations. Large producers receive technical assistance from input suppliers and agronomists they hire. Small producers who are members of the associations receive technical assistance from the associations, which generally finance the technical assistance with resources from the Ministry of Agriculture or International Cooperation Programs.

- It is important to note that even larger producers report needing more assistance from PepsiCo, particularly to learn best practices.
- In Meta, lead producers revealed that it is increasingly common to see women providing technical assistance and serving in sales roles in agricultural commodity companies. It is also common that the technical assistance provided by associations is directly provided by women.
- While PepsiCo does not provide technical assistance to producers or associations, the PepsiCo Foundation has trained the associations in "Good Manufacturing Practices" and has provided training focused on the *Maquilas*' process. During interviews with associations, it was also mentioned that PepsiCo provided them with machines to create their own *Maquila*, discounting their cost from their bill.

> "PepsiCo is a good client: We would like to receive research assistance in crop monitoring, analyze the best agricultural practices. They don't evaluate competing suppliers with the same criteria. The prices are fine." (Focus Group, lead male producers).

Association Strengthening: The PepsiCo Foundation also works with plantain associations to increase their capacity and supply to PepsiCo. This work has been less intensive and demanding with the plantain associations in the Coffee Region than compared to the Potato Associations in Boyacá. The plantain associations were already experienced working as an association and supplying large corporations like PepsiCo. In addition, unlike the Boyacá associations, these are not women-led and have only a minority of female producers (more details about their work in Box 2).

Box 2. The Case of Strengthening Plantain Associations

PepsiCo and the PepsiCo Foundation has worked with two associations of plantain producers: ASPLABEL and ASPROAGRO. Unlike the case of potato, plantain production has not been supported by *Reconciliacion Colombia*, and their support has been weaker. The Foundation does not have an agronomy team fully devoted to the plantain, which has been a limiting factor. PepsiCo suggests that they have not provided the same support to plantain associations such as ASPLABEL as they have to potato associations ASOAGROTOCA and ASORQUIDEA since the plantain associations were already mature when they started working with PepsiCo.
ASPLABEL, originally exclusively focused on coffee production, was founded in 2000 and their *Maquila* was established in 2010. At first there was closer support, but over time the relationship became purely

business-oriented. The association has 80 members, only ten of them women (12.5%). There are three women that are involved in administrative tasks. Timeline of PepsiCo Foundation engagement with ASPLABEL:

- In 2008: The PepsiCo Foundation engaged in conversations with the local government of the State of Risaralda Government and a strengthening process was carried out. This process included aid concerning:
    - Infrastructure (conveyor belt)
    - Leadership (with FUNDES)
    - Training in technical topics (with the SENA)
- In 2020: started a project to build a daycare to be managed by the *Maquila Association*. Completion of the facility has been delayed due to COVID-19 but that community has started to use the services.

In the past few years, the relationship between ASPLABEL and PepsiCo has weakened, due to misunderstandings and the feeling that the association is not fully transparent with PepsiCo. There is the hope that these problems of loss of trust could be solved by an intermediary and a community mediator.

ASPROAGRO is an association with which there have been no such problems, since its relationship with PepsiCo is recent. It has 100 members, only eight of them being women (12.5%). Although the association is led by a man, there are three women that are involved in administrative and operative tasks. There have been a few efforts to strengthen the association:

- Program "*Las manos detrás de Natuchips*[37]" (Hands Behind Natuchips) to link the brand with the association 100% and included:
    - Training in association organization[38]
    - Training in administrative skills
    - Helping ASPROAGRO grow its provider universe by giving them benefits
    - Training to improve productivity

One of ASPROAGRO's main problems has been the relationship with the leaders of the Embera indigenous reservation, home to most of the peelers..

Lessons learned:

- Implement and share a new association model that allows the GDA to reach common ground so both PepsiCo and the associations can project themselves into the future and solidify the projects they execute. The Productive Alliances project of the Ministry of Agriculture and some projects supported by USAID have shown good results and lessons learned[39].
    - This model includes: Identification of productive agglomerations or clusters of producers, formation of associations, registration with the Chamber of Commerce, and obtaining the Single Tax Registry (*RUT*); putting in place a governance structure, holding general shareholders' meeting, creating a board of directors, enhancing accounting systems, defining organizational structure, negotiation of marketing agreements and contracts, definition of logistics aspects, recording operations.
- Train businesses on integrating environmental and economic sustainability objectives in associations to improve relationships and long-term viability.
- Improve the relationship with the Embera Indigenous Reservation.

3.2. PepsiCo's Main Supply Chain Challenges

Current difficulties with the supply for Sabaneta (Antioquia): Recurring road closures due to landslides from heavy rain on the roads connecting the Coffee Region and Sabaneta makes supply intermittent.

[37] Natuchips is PepsiCo's plantain snack brand.

[38] Training in associativity includes courses in the advantages of associations, associative schemes, values and principles of associations, associations' regulatory framework, associations' organizational structure, and administrative fundamentals of associations (see Appendix 3).

[39] Ruiz, M. Reyes, A. *Desarrollo Rural Alternativo Sostenible. Lecciones aprendidas. Lecciones impartidas. Programa MIDAS de USAID*. 2010. 120 pp.

PepsiCo could buy plantain from Uraba (Antioquia), which is an important plantain producing area in Colombia.

Lack of generational renewal: Although a huge concern with potato and overall with agricultural production in Colombia, future planning was not cited by technical experts and lead producers as a concern in any interviews. Nevertheless, lack of generational renewal in agriculture is a national problem that needs solutions[40]. Some women in the focus groups expressed this concern.

Price fluctuations: Plantain prices in Colombia due to high volatility, variability, and seasonality often affect producer ability to fulfill their contract with PepsiCo. When producers do not meet volume needs through contracts established at the beginning of the season, they buy additional plantain from other suppliers.

Climate change: Weather volatility can bring harvests forward or backward affecting PepsiCo's purchasing schedule. If the harvest comes early due to an early summer, producers often push for purchases to be made earlier. The weather can also affect the volumes harvested which directly influences plantain prices. Winter seasons characterized by heavy rains are becoming heavier with climate change increasing the threat of mudslides and road closures. Such conditions impact producers traveling to farms, transportation of plantain, and restricts women's mobility to *Maquilas*.

Urbanization is increasing land prices: Pressure on land prices that existed before the pandemic have increased with COVID-19. Many people who lived in cities are building houses in rural areas, transforming the landscape and driving up prices. This is creating an urbanization of rural areas near optimal lands for crops for PepsiCo suppliers in Cundinamarca (moving from Bogotá) and in Antioquia (moving from Medellín). This is also the case in Meta after the signing of the peace treaty with the FARC-EP guerrilla.

3.3. Women's Participation in PepsiCo's Plantain Supply Chain: Barriers and Opportunities

3.3.1. Women's Participation in PepsiCo's Plantain Supply Chain

Only two female-led producers currently have direct contracts with PepsiCo. Of the two associations, none are female-led and only 16.6% of ASPLABEL (10/60) and 8% of ASPROAGRO (8/100) are female producers. Women are also absent from the production process as workers (planting, sowing, harvesting, packing). On the contrary, they represent about 90% of plantain peelers.

Plantain production is traditionally a male-dominated sector due to cultural and social norms, and the strength required to do the heavy work in the absence of machinery. A sack of potatoes averages 35 kilos—10 kilos above the limit allowed by safety regulations.

> "It's very complicated. The majority of the [plantain] jobs are tough and require a lot of physical strength. Sure, women can separate the banana suckers, pack bananas… I don't know how many you will find because in the Ariari culture, women are more present in the home." (Focus Group Men, Meta)

[40] Martinez-Restrepo, S. Petruz, M. Ramírez, J. *La situación de la educación rural en Colombia, los desafíos del posconflicto y la transformación del campo.* 2015. Compartir. Fedesarrollo. https://www.compartirpalabramaestra.org/documentos/fedesarrollo_compartir/la-situacion-de-la-educacion-rural-en-colombia-los-desafios-del-posconflicto-y-la-trasformacion-del-campo.pdf

***Cormo* and plantain cleaning:**

- The case of one lead producer near Granada, Meta (a larger town with high female unemployment), revealed that on his farm, women clean the *cormo*, and are involved in the cleaning and disinfecting process of the plantain before it is packed and sent to the *Maquilas* in Bogotá. Women laborers in this farm are recruited by contractors in Granada.
- In the Coffee Region, it is common to see women hired to work in the nurseries, working on spreading, cleaning, and disinfecting plantain.

Logistical and administrative tasks:

- Overall, women work in administrative tasks. This was common in all regions among large producers and associations.
- Some interviews revealed that small producers have challenges keeping their records and a desire for wives to support their husbands/partners with administrative tasks and record keeping. It is unclear if this issue is caused by low education levels and low literacy skills common in rural areas.

Food preparation for workers:

- During harvest, women prepare meals for workers.
- In Meta, lead producers either own or rent the land. Land rental affects the amount of women working during harvest, since some lands are rented with houses and others are not. When lodging is available on-farm, workers stay for 2-3 days, and women are hired as cooks. Otherwise, laborers need to bring their own food.

Technical assistance and sales personnel in agricultural commodity trading companies*:*

- In Meta, lead producers reported seeing increasingly more women in technical field roles (*ingenieras agronomas*). Although they are still a minority, they are respected and trusted.
- Many women work as sales personnel of agro services stores that, in addition to providing inputs for plantain production, also occasionally act as creditors of the producers.

Plantain peeling:

- About 90% of peelers are women and live in urban or semi-urban settings.
- Interestingly, all women peelers now live in Bogotá and are transplants from rural areas of Colombia, ex. Llano.
- In Argelia Valle, this work is mostly performed by the indigenous women community, Embera-Chami*,* and poses additional challenges in integrating women with a different culture, social norms, and even governance (see Box 3).

Plantain peel waste:

- Although not part of the PepsiCo value chain, it was interesting to learn that some women are involved in the commercialization of the plantain peel that is used to feed the livestock around Cundinamarca. During interviews, lead producers revealed that two women bought the plantain peel, one to feed their own livestock and the other to re-sell to other small farms.

3.3.2. General Barriers to Greater Women's Participation in PepsiCo's Potato Value Chain

Gender roles permeate PepsiCo's plantain supply chain in a variety of ways:

- Men are more likely to own land, and compared to women landowners, they have larger landholdings. This allows them to access credits since they have collateral. During interviews, the perception was that there is no discrimination against women when accessing loans, but rather that women are less likely to have land, and generally cultivate less than men, which makes them less attractive for credit. Men also have more access to information.[41]
- The fact that PepsiCo wants to work with large producers, limits the number of women *Maquila* owners or lead producers because women generally do not own large land extensions and/or have the personal funds to finance the costs of production.
- The plantain value chain remains male-dominated; in large part due to a common perception that most activities described in section 2.1 require men's unique physical strength. The lack of mechanization makes the production system reliant on worker ability to carry 25-35kg sacks of plantain, with women legally permitted to carry no more than 12.5kg and men no more than 25kg.
- In addition, traditional gender roles in rural areas "dictate" that women should stay at home and take care of children and their farm crops (many for subsistence purposes) while men work in agriculture as *jornaleros*. While women and men have access to both technical assistance and training, men are more likely to attend either; with domestic chores women's free-time is scarce. Every single focus group and interview mentioned these traditional gender roles.
- Unlike the case of potato producers, there is no evidence that women producers are less likely to make decisions about what to plant where or how when they are the landowners. Women mentioned that they have the same decision-making power as men and that decisions on what to plant, how, and where are usually shared. Nevertheless, it is important to note that there are very few female producers and that the ones interviewed (ex. female-led producer associations) were already leaders that had previously "broken through the glass ceiling". So the decision making power depends on whether women owned the land and/or were the lead farmer on the contract with the association.
- Interviews revealed that there are significant geographical differences between female and male producers. Social and cultural norms differ regionally and they affect women's involvement in the production, harvesting, and post-harvesting processes.
    - Women are more involved in the peeling process of the plantain done in urban or semi-urban (*cabeceras municipales*) areas such as Argelia Valle and Belen de Umbria, than in rural areas[42]. This is consistent with the "traditional role of rural women as caregivers".
    - Women involved in the *cormo* and plantain cleaning were hired from a small town called Granada and were indigenous.
    - In Argelia, Valle, the *Maquila* at ASPROAGRO hired indigenous women. Totaling 33/50 women from the indigenous Embera-Chami community which represents 66% of the *Maquila* peelers.

[41] This information comes from a variety of sources: desk review, interviews of lead producers, associations, USAID.

[42] In the case of Belen de Umbria, the *Maquila* is approximately 10 minutes by car from the town center. Most of the peelers live in the urban area of the town. Some live in nearby districts and commute by motorbike or are driven by their partners. In the case of Argelia, the *Maquila* is also located in the urban area of the town. Most of the peelers, who come from the Embera indigenous community, live in the indigenous reservation approximately half an hour away by car. The rest of the peelers live either in the urban area of the town or in neighboring districts. For the *Maquila* in Bogotá, peelers live in the city and go to work by bicycle, motorbike, or bus.

Box 3. Indigenous Embera-Chami Women Peelers in *Maquilas*

Of the 50 peelers that work in ASPROAGRO'*s Maquila,* 33 of them are indigenous women from the Embera-Chami community in Argelia, Valle del Cauca. As the majority of the *Maquila* personnel, they are essential for its proper functioning.

Interviews and focus groups revealed that:

- Married Embera-Chami women need the permission of the reservation leaders and their husbands to work, especially because of the *Maquila's* early shift schedules[43]. Since they know that women like to go to the *Maquilas*, they force them to do additional tasks to grant them permission. While husbands like the money their wives earn, they prefer that women only work and interact with members of their own community.
- Most of the peelers give their payment to their husbands as soon as they receive it. In fact, indigenous peelers are usually accompanied by their husbands, who tend to monopolize it, when they collect their payment.
- Women often suffer from domestic abuse and customary punishment when men or reservation leaders perceive they have not complied with the community's rules. Although there is no information from the focus groups about the exact rules, it is important to consider that indigenous communities in Colombia have their own communal land, culture, languages, and rule of law.
- Domestic tasks and care work are unequally divided between men and women. Traditional macho thinking is deeply ingrained in the community, leaving all unpaid tasks (child care and domestic chores) as women's responsibilities.
- Association leaders and the PepsiCo Foundation have tried to get closer to the indigenous communities by sending gifts to the community leaders and to husbands.

In 2020 there were several cases of COVID-19 in the Embera indigenous reservation and women were unable to work for several weeks, since the community leaders did not grant them permission to leave the reservation. This event was especially serious for the *Maquila*, which had to operate with only 34% of its usual staff. For this reason, during those weeks, working hours were significantly extended for the rest of the peelers. This created a very delicate situation in the reservation, because by not being able to leave, the women could not contribute economically to their homes, and they ended up running out of supplies.

GDA key dimensions and any initiative including indigenous women will need to "negotiate" the program goals with specific cultural and social norms of these communities.

3.3.3. Barriers Created by PepsiCo's Product Requirements

Production capacity: As in the case of potato, PepsiCo prefers to work with large producers and associations, which excludes female producers that have, on average, less land, fewer financial resources, less access to credit, and risk adversity. Small female producers access the PepsiCo supply chain only through associations. While there are women producers as members of associations, they constitute a minority.

The risk of early/late working schedules for women: The time of arrival to *Maquilas* can represent a risk to women's safety. During interviews in the State of Risaralda, Valle del Cauca, and Bogotá, it was evident that women peelers who arrived to work at 6am faced some risk. Colombia's sun rises between 5:30 am to 6am all year round, which means women leave their homes when it is still dark outside. This is particularly alarming in Bogotá, where there are high rates of street robbery, sexual harassment, and sexual abuse in public transportation and even public spaces. Between 2011 and 2017, the TransMilenio

[43] Early shift schedules (starting at 6am) means that transportation might occur before sunrise.

station and buses were the places where the most high impact crimes were committed[44]. In 2017, there were 3,511 cases of alleged sexual crimes, with 28.7% of them happening in a commute[45]. In the town of Belen de Umbria, it was reported that the local police would escort women to ensure their safety. It is important to consider that if the early morning shifts cannot be changed due to delivery schedules, an unintended consequence could be a decrease in the number of women hired.

Harvesting model of large producers: As in Meta, harvesting could require laborers to stay on the farms for several days. This system can have a greater impact on women that cannot leave their families and children for several days to harvest because they are also the caregivers; this is in addition to safety concerns and/or jealous husbands. The harvesting model can instead create opportunities for women in cooking activities. This often happens only when farms have the capacity to feed large quantities of workers (ex. having a big house with a big kitchen).

The role of contractors: The few women involved in the production process of large farms in Meta were hired by contractors in Granada. This could suggest that the problem and solution to hiring more women laborers come from the willingness of those contractors to include more women among their workers and finding willing women.[46]

3.3.4. Existing Barriers: Supplier Perspective

Supply-side barriers also play a role in becoming PepsiCo's suppliers. In addition to the aforementioned disparities in accessing land, inputs, and financing that also apply to the potato value chain, other supply-side factors affect women's likelihood of becoming part of PepsiCo's value chain.

Traditional gender roles:

- Among families that own land, women take care of children and their homes, and men work in the plantain production.
- Belen de Umbria's ASPLABEL has worked hard to promote the inclusion of women in the association, even though the majority of producers are still men. Female-led producers are seen differently, as outliers, but also as "warriors" because they "work" and lead the association.
- Lead farmers in Meta attributed the male dominance in the sector to the physical strength requirements. Additionally, interviews revealed that working moms had a very difficult time balancing household and child care responsibilities while working. The perception was that their husbands did not assume additional responsibilities when women started working outside the home.

Care activities:

- Women are more dedicated to care activities and not to crop production.
- Care activities and tending to subsistence crops limits women's time to perform other income-earning activities, attend training, and receive technical assistance.
- In the case of ASPLABEL, The PepsiCo Foundation[47] made a donation to establish a daycare.

Urban and semi-urban women are more likely to work in the value chain than rural women.

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[44] World Resources Institute. Despacio. *Las Mujeres y el transporte en Bogotá: las cuentas.* 2020. https://www.despacio.org/wp-content/uploads/2020/03/mujeresbogotalascuentas20200303web.pdf

[45] Ibid.

[46] No interviews were done with contractors, so this is hypothetical and based on the perceptions of lead-producers in Meta.

[47] In the interview, it was referred to as PepsiCo, but it is believed that she was referring to The PepsiCo Foundation.

- Women involved in the plantain value chain tend to be from urban or peri-urban places.
- In the case of Granada, Meta, where more women have been involved, this was attributed to women being unemployed and available in larger, nearby towns. This is an interesting phenomenon that shows that urban women are more likely to have paid work, while rural women tend to stay home caring for children and maintaining their own farms and subsistence production.
- It was evident in the *Maquila* interviews in Bogotá that all women lived in the city but migrated from the countryside when younger.
- Most women in the town of Belen de Umbria were head of household, victims of the armed conflict (displaced or widows), and indigenous.

Lack of digital inclusion and skills:

- Similar to women in potato, plantain producers lack access to information, connections to buyers, and access to online training. As the global pandemic has emphasized a transition to digital services, women risk being further marginalized.
- In Colombia, low-income rural women have smartphones, which facilitates access to training and information. Nevertheless, most women living in rural areas have no access to computers or to unlimited data for cell phones or WiFi at home.

3.3.5. Behaviors and Unconscious Bias within the Ecosystem

In addition to the barriers women face from the supply and demand side, there are other barriers in the plantain ecosystem, that include sexual harassment, bias and discrimination, and technical assistance that do not consider the differential needs of women.

Discrimination creates less access to financial help for women: While women interviewed attribute discrimintation to their lower access to land and collaterals, evidence from studies[48] also reveals bias against women in loan approvals and amounts approved. This bias includes asymmetries of information on available loans and grants.

Bias and discrimination in commercial environments: As in the case of the potato, women from plantain associations reported having suffered from bias and discrimination in commercial environments, describing them as very chauvinistic. Women even report being paid less for the same work or product as men. In circumstances created by this discrimination, they send family members to negotiate.

Technical assistance: While time scarcity and gender roles play a role in women's decreased access to technical assistance, it is clear that the advisers do not consider women's differential needs.

> "Depends on the training or depends on the schedule, or depends on the place where the person comes from. Sometimes, they say, 'No, you go because he has to work'. Other times they say, 'No, the man should go because the woman should cook food for the laborers'." (Lead female farmer)

Sexual harassment: As in the case of the potato, some women talked about the existence of sexual harassment and issues among married workers generating conflicts. It is believed that the problem of sexual harassment is much more prominent than expressed in the interviews and focus groups due to the low level of awareness about this issue.

[48] Ramírez, J. Martínez-Restrepo, S. Sabogal, A. Enríquez, E. Salas, R. Rodríguez, V. *Barreras de acceso de la mujer rural a crédito.*

Gender-based violence (GBV) is particularly common among female peelers from the indigenous community that works with ASPROAGRO. It is important to note that the absence of stories of domestic violence outside the communities does not mean they are not happening. It is estimated that 66% of women in Colombia have suffered from any kind of gender-based violence during their lifetime (DHS, 2015) and only 27% of women report to formal sources. GBV among indigenous communities even includes forms of economic violence in which husbands take away women's earnings.

> "We've had a lot [of incidents] with the men from the reservation… many conflicts with them because they are very sexist. They want women to work and give them the money, and leave everything in the house in order before coming to work… the women can't give their opinions. They were very quiet when they arrived at the *Maquila*, but they rebelled… I think I have something to do with this because we've had a lot of training about mistreatment of women" (Administrative assistant).

Interviews revealed that when farms are in the name of women, there are no gaps in accessing credits. Therefore, the main issue is not discrimination, but access to land, or lack of information. For example, a lead female producer suggested that information about credit and financial options reach men more easily than women because they are seen as more suitable for credits and other financing methods due to their collateral.

4. CONCLUSIONS AND RECOMMENDATIONS DEVELOPED IN COUNTRY PLANNING

This report provides key information to understand PepsiCo's value chain as well as the barriers and opportunities women encounter in accessing and becoming PepsiCo producers, workers, and technical assistants. Currently, women represent a minority of producers and workers within the PepsiCo supply chain of potato and plantain.

In potato, the study found that out of the current 81 PepsiCo suppliers, 65.4% are individual men, 17.3% are companies, and 13.6% are women with individual contracts. Only 3.7% of PepsiCo's supply comes from associations. Two of the associations are led by women and made up of mostly female producers.

In plantain, of the eight producers of peeled green plantain, two are associations with 160 members, of which 18 are women. Including the members of the associations, there are 226 producers, of which 20 are women (8.8%). Of the 20 women, 18 belong to associations and two are producers that have a contract with PepsiCo.

Gender roles in PepsiCo's potato supply chain respond to cultural and historical processes, the strength required to do heavy lifting, and PepsiCo's purchasing preferences. PepsiCo has a great opportunity to increase the number of women in its value chain while promoting their empowerment and in turn boosting PepsiCo's productivity and innovation.

Given the roles women hold in PepsiCo's potato and plantain value chain as detailed in this report, the Investing in Women to Strengthen Supply Chains partnership will develop activities that engage women as means to overcome some of PepsiCo's key business challenges. PepsiCo faces the challenge of achieving the following core supply chain goals in Colombia:

- Increase SFP-verified, PepsiCo quality-compliant potato procurement by 25%

- Improve crop quality through reducing the rejection rate of PepsiCo potatoes from 30% to 10%
    - Most critically, the incidence of polilla guatemalteca (a moth native to Guatemala which can damage potato crop) and green potatoes (a signal of either harmful toxins or poor storage) decreases the quality of crops that PepsiCo receives at the plant from suppliers
- Increase yields and productivity: increase potato purchase from current farmers by 100% (17.5MT/ha to 35MT/ha)
- Decrease land requirements by 33%
- Accelerate introduction of Frito-Lays varieties in new zones supported by CIAT climate resilience analysis
    - Note that the process for registering new varieties with the Colombian government can take years to accomplish
- Improve PEP cost control and planning: Increase PEP contract compliance (right now 17.5MT/ha for 25MT/ha contract) and improve overall farmer loyalty
- Achieve progress towards PepsiCo's global regenerative agriculture goals which include:
    - Soil Health
    - Carbon reduction & sequestration
    - Watershed health
    - Biodiversity
    - Farmer livelihoods

The following three entry points of activities have the potential to address PepsiCo's core business challenges. In partnership country work planning, activities will be further detailed in order to articulate how the business case can be achieved.

Entry point	Core business challenge addressed
LARGE FARMS: Empower and equip women in current roles on existing PepsiCo contract farms, maquilas and/or develop complementary supply chain roles; Explore opportunities in new sourcing regions	● CROP PERFORMANCE & QUALITY. Improve technical skills through developing 'gender-smart' demonstration farms. which will provide women access to Mentorship to women who are lead farmers of large farms will improve crop quality and productivity ● REGENERATIVE AGRICULTURE. Provide mentorship to women lead farmers on complementary targeted demo farm practices (eg IPM,soil health) to prepare them to host demonstration farms in the next season. Engagement of men and women on demonstration farms will increase quality ● LIVELIHOODS. Improving working conditions on farms through norms change programming to accept women in new roles can improve farmer livelihoods (a PepsiCo regenerative agriculture goals)
ASSOCIATIONS: Strengthen existing associations in new sourcing regions and build women smallholders' capacity to become PepsiCo suppliers	● NEW SOURCING ZONES. In builduilding relationships with new associations to, PepsiCo can increase sourcing from new areas prioritized by PepsiCowhich are target PepsiCo growth areas (such as Antioquia) ● LOYALTY & QUALITY. Technical assistance to associations will build trust and loyalty with new suppliers while also contributing to meeting PepsiCo specifications ensure their loyalty
INTERNAL CAPACITY: Advocate	● LIVELIHOODS. Develop staff (PepsiCo agronomy team)

and align internally to improve policies, ways of working, and data collection to create an enabling environment for women's empowerment	competencies and awareness on gender related issues so that staff can provide appropriate engagement and technical assistance to women in a way that accommodates their needs; prepare PepsiCo to integrate women's empowerment into local team culture and lead activities in the future

APPENDIX 1. METHODOLOGY & RESEARCH LIMITATIONS

The analysis presented in this report comes from a mix of a literature review, interviews and focus groups, and quantitative data from the National Agricultural Census (CNA). The qualitative methodology (in-depth interviews and focus groups) sought to understand the role of women in the potato and plantain chains in Colombia, specifically in PepsiCo's production procedures, from the point of view and the experience of a sample of actors that are part of these chains. The study included information from:

- A literature review of studies, mostly done in Colombia, about women's empowerment in agriculture in Colombia.
- Seven interviews, ten focus groups for producers, farmers, plantain peelers, associations in the states of Boyacá and Cundinamarca (potato), Meta, North of Valle, Risaralda, and Bogotá (plantain). No interviews or focus groups were done in Antioquia[49].
- 20 interviews with lead experts and PepsiCo personnel.
- Data from the CNA.

Interviews and focus groups took place between March and May, at the beginning of the third wave of Covid-19 in Colombia, and amid massive social protests, which limited the ability of the research team to perform all interviews and focus groups in-person. While most interviews were conducted remotely, focus groups were held in person by high-level experts in the field (gender and value chain specialists and agronomists). Interviews were transcribed and then analyzed with AtlasTI, software to organize, code, and analyze qualitative data.

Research limitations: Unlike an audit that randomly samples respondents from the supply chain, this qualitative study relied on a purposive sample. It did not include representation from the universe of all women and men that belong to PepsiCo plantain and potato value chains. According to the above and considering the characteristics of this type of research methodology, the results obtained cannot be generalized and do not represent the entire population of the potato and plantain chains.

Furthermore, due to the Covid-19 pandemic and biosecurity issues, both interviews and participants in the focus groups were limited. Added to this, is that a large part of the interviews and some focus groups were carried out virtually, which prevented close contact with the different actors.

[49] According to information provided by PepsiCo, the company present in Antioquia does not currently have good relations with the associations that were planned for the field work of potatoes (Giraldo) and plantains (Buritica). They recommended that the team not conduct interviews or focus groups with these actors.

APPENDIX 2. LIST OF STAKEHOLDERS

Table A. Stakeholders Interviewed - Potato

Respondent Type	Methodology	Geographic Emphasis	Total participants
Lead-male farmer	1 Focus Group	Boyacá (potato)	4
Female-lead producers	1 Focus Group	Boyacá (potato)	6
Female-lead producers	2 IDI	Boyacá (potato)	2
Female laborers	1 IDI	Boyacá (potato)	1
Women members of PepsiCo households	1 Focus Group	Boyacá (potato)	4
Private sector	1 IDI	Boyacá (potato)	1
Agricultural expert	1 IDI	Boyacá (potato)	1

Source: Elaborated by Fedesarrollo.

Table B. Stakeholders Interviewed - Plantain

Respondent Type	Methodology	Geographic Emphasis	Total participants
Women-members of PepsiCo households	1 Focus Group	Meta (plantain)	2
Male Lead Producer	1 Focus Group	Meta (plantain)	3
Female laborers	1 Focus Group	Bogotá (plantain)	6
Female-lead producers	1 Focus Group	Risaralda (plantain)	5
Female-lead producers	1 IDI	Risaralda (plantain)	1
Female laborers	1 Focus Group	Risaralda (plantain)	6
Male Lead Producer	1 Focus Group	Valle (plantain)	3
Female-lead producers	3 IDI	Valle (plantain)	3
Female laborers	1 Focus Group	Valle (plantain)	6

Source: Elaborated by Fedesarrollo.

Table C. Stakeholders Interviewed - General (Includes Potato, Plantain and other Agricultural products)

Respondent Type	Methodology	Geographic Emphasis	Total participants
PepsiCo	KII	National	5
Government: Ministry of	KII	National	2

Agriculture			
Gender experts: USAID	KII	National	2
Private sector: *FEDEPAPA, ASOHFRUCOL, SAC, ALPINA*, *JA&A*	KII	National	5
Agricultural expert: USAID	KII	National	1
University: *Universidad Nacional de Colombia*	KII	National	1

Source: Elaborated by Fedesarrollo.

APPENDIX 3. COMPREHENSIVE LIST OF SKILL DEVELOPMENT NEEDED BY ASSOCIATIONS IDENTIFIED DURING INTERVIEWS

- Records
- Production costs
- Accounting
- Business Administration
- Entrepreneurship
- Cooperativism and associativity (the process of forming an association)
- Scheduling
- Food handling and preparation
- Food industrialization
- Logistics
- Recruitment (law)
- Commercialization
    - Knowledge and access to markets
    - Knowledge of the ecosystem
    - Sales
    - Marketing
- Negotiation
- Management
- Leadership
- Systems and programming
- Secretariat
- Agricultural engineering
- Agricultural technicians
- Environmental techniques
- Handling of tractors and agricultural machinery

APPENDIX 4. AGRIBUSINESS ECOSYSTEM IN COLOMBIA

The agribusiness ecosystem has several players that can partner with the GDA and PepsiCo in order to create a validating environment for women.

Ministry of Agriculture and Rural Development:

- Program "*Coseche y siembre a la fija"* (Harvest and sow with certainty) (Contract farming). Since PepsiCo's suppliers have contracts with the company, they are eligible to receive the program benefits. Associations could access the program to obtain loans for investment and working capital with subsidized interest rates and access support for the purchase of agro-climatic risk insurance.
- Program "*Apoyo a Alianzas Productivas"* (Support for Productive Alliances). Since PepsiCo's suppliers have contracts with the company, they are eligible to receive the program benefits. The associations could access the program to obtain inputs and fertilizers for the crops and other activities within the program to strengthen the associations.
- Program "*Mujer Rural*" (Rural Woman). Women's associations can access support for training in entrepreneurial activities and the general strengthening of associations.

FINAGRO and Agrarian Bank

- Special Line of Credit-LEC (*linea especial de credito*)-for Rural Women. Women can get a LEC, which includes a subsidy to the interest rate and other preferential conditions.
- Agricultural Guarantee Fund-FAG. Women can turn to the FAG to guarantee loans when they do not have the sufficient guarantees required by the banks.

FEDEPAPA: Offers technical assistance to small producers and associations. Associations can apply to FEDEPAPA for the entity's technicians to provide free technical assistance.

SENA offers free training in: Farm machinery handling, agricultural technology, environmental technology, entrepreneurship, associativity, food handling and preparation, secretariat, systems and programming.

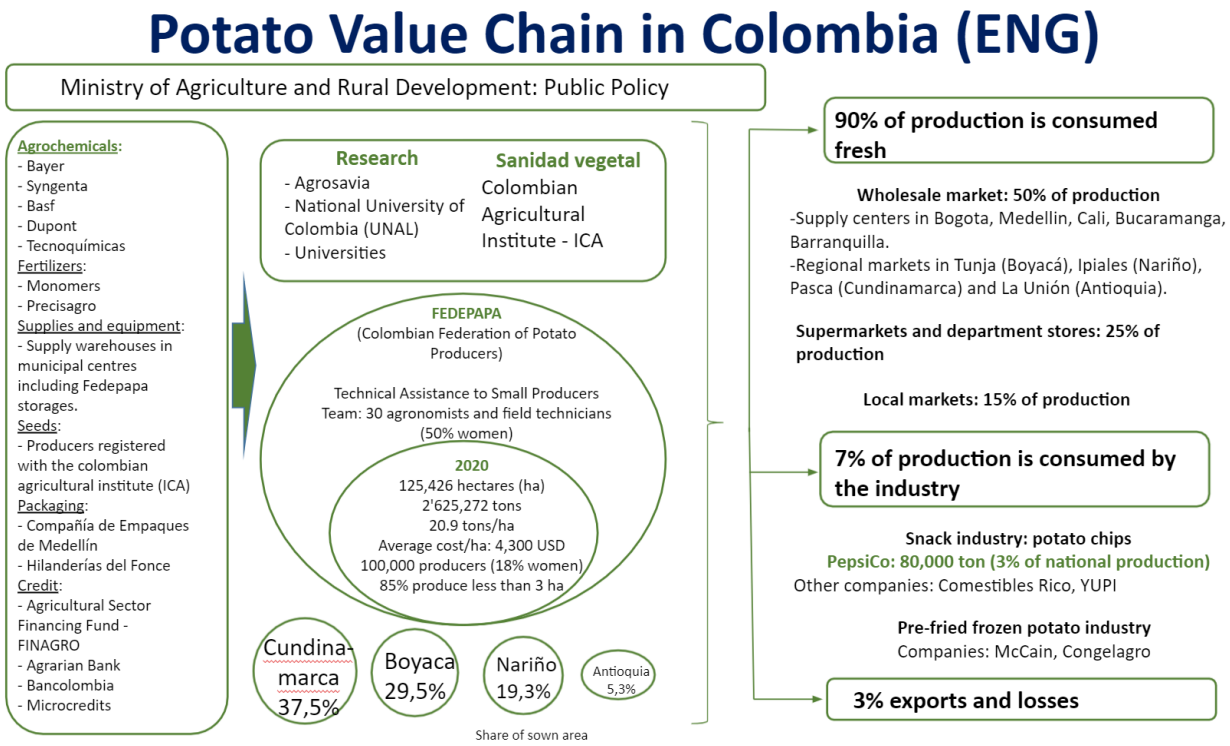
The programs driven by the Ministry of Agriculture and Rural Development, FINAGRO and the Agrarian Bank, listed before, target both women potato producers and plantain potato producers.

APPENDIX 5. SUMMARY OF THE POTATO SUPPLY CHAIN IN COLOMBIA

According to the National Agricultural Census (CNA), in Colombia, potato production is mostly done at a small-scale since 85% of all producers and 98% of women cultivate less than 10 ha. Generally, productivity is low, which is reflected in low average yields of 20.9 tons/ha. Only 44.2% of the producers receive technical assistance and the majority use rented machinery or animal traction for production (oxen and horses). Additionally, the use of certified seeds is not common and only 34.2% of producers have access to irrigation. There is relatively high informality in land ownership, since only 55.6% of producers own their land. Producers also have low levels of access to capital, since only 20.7% have received credit in formal settings. Moreover, the low levels of social capital are reflected in the fact that only 14.1% of the producers belong to an association.

The producers are represented by the Colombian Federation of Potato Producers (*FEDEPAPA*) that offers technical assistance to small producers, and is composed of a technical team of 30 agronomists and technicians, of which 50% are women. The Colombian Agricultural Research Corporation (*AGROSAVIA*), together with several universities, especially the National University of Colombia (*UNAL*), investigates genetics (new varieties), crop management, and pests and diseases. The Colombian Agricultural Institute (*ICA*) is in charge of prevention, surveillance, sanitary control, and registering the producers of certified seed.

Figure A. Potato Value Chain in Colombia



Source: Author's elaboration based on interviews,focus groups and administrative records.

Approximately 90% of potato production in Colombia is consumed fresh: 50% is sold through wholesale markets (central supply centers and regional markets), 25% through supermarkets and department stores, 15% through marketplaces. A remaining 7% of potato production goes to the agri-processing industry, partly to the production of frozen pre-fried potatoes (McCain and *Congelagro*) and partly to the production of potato chips, of which the main food companies are PepsiCo, *Comestibles Rico,* and *YUPI*.

APPENDIX 6. GENDERED TASKS IN POTATO AND PLANTAIN SUPPLY CHAINS

Table A. Summary of Female-Male Roles by Task - Pepsico's Potato Supply Chain

Input Provision		
Summary of activities	Seed multiplication and provision of different input supplies (fertilizers & agrochemicals: Herbicides, Fungicides, Insecticides)	
PepsiCo's current involvement	Provides seeds	
Task	**Large Farms Male-Owned (86.2% of suppliers)**	**Female-led Associations and Female-Owned (13.8% suppliers)**
Task A: Buy/receive seeds from PepsiCo	None.	Female producers and women that lead the associations receive the seeds from PepsiCo.
Task B: Buy input supplies	Generally none. But sometimes wives support their husbands in buying (requesting) supplies.	Female producers and women that lead the associations buy the supplies.
Task C: Secure Financing	Generally none. But sometimes, wives support their husbands in preparing documentation.	Female producers and women from associations carry out administrative procedures to access loans.

Potato Production		
Summary of activities	Land preparation, sowing, fumigation, irrigation	
PepsiCo's current involvement	No involvement/no agronomic support	
Task	**Large Farms Male-Owned (86.2% of suppliers)**	**Associations and Female-Owned (13.8% suppliers)**
Task A: Land preparation	None.	None.
Task B: Sowing	None.	None.
Task C: Fumigation	Generally absent. In some cases, there were women supporting the application of pesticides.	None. Women that won the land, hire workers or get their partners' support to finish this task.
Task D: Irrigation	Generally absent. In some cases, women provide support turning on the pump, and tasks that do not require strength.	None. Women that won the land, hire workers or get their partners' support to finish this task.
Task E: Weeding	None.	None.

Task F: Crop rotation	When crop rotation is done with cattle, women are involved in feeding them and milking the cows.	When crop rotation is done with cattle, women are involved in feeding them and milking the cows.

Harvest & Processing		
Summary of activities	Land preparation, sowing, fumigation, irrigation	
PepsiCo's current involvement	No involvement/no agronomic support	
Task	**Large Farms Male-Owned (86.2% of suppliers)**	**Associations and Female-Owned (13.8% suppliers)**
Task A: Harvest (harvest, selection and packaging)	Absent in the harvesting and packaging, but they sometimes participate in the selection process. Families work together and women are assigned tasks that do not involve strength.	Absent in harvest and packaging. Generally those that pack, also lift sacks to the trucks, which requires strength. Families can work together and women are assigned tasks that do not involve strength.
Task B: Administrative Tasks and feeding workers	Women are generally involved in tasks. ex. accounting, bookkeeping, logistics and cooking for the workers	Associations are led and managed by women. They perform for the most the administrative, logistical and cooking tasks.
Task C: Transportation	None.	None. Women hire male drivers that also lift the potato sacks.

Table B. Summary of Female-Male Roles by Task - PepsiCo's Plantain Supply Chain

Input Provision		
Summary of activities	Propagation and provision of different input supplies (fertilizers & agrochemicals: Herbicides, Fungicides, Insecticides)	
PepsiCo's current involvement	No involvement/no agronomic support	
Task	**Women's role on: Large Farms Male-Owned**	**Women's role on: Associations and Woman-Owned Farms** *(2 women direct contract holders, 18 women that are in associations)*
Task A: Propagation of plantain seedlings (known as *cormos*)	On some farms, women clean, disinfect and reproduce the *cormos*. Across Colombia, women often work in seedbeds.	Clean, disinfect the *cormos*.
Task B: Buys input supplies and/or plantain seedlings	None.	Women tend to producers buy input supplies.

Task C: Secures Financing	Generally none. But, sometimes, wives support their husbands in preparing documentation.	Female producers carry out administrative procedures to access loans.

Plantain Production		
Summary of activities	Land preparation, sowing, fumigation, irrigation	
PepsiCo's current involvement	No involvement/no agronomic support	
Task	**Women's role on:** **Large Farms Male-Owned**	**Women's role on:** **Associations and Woman-Owned Farms** *(2 women with direct contract holders, 18 women that are in associations)*
Task A: Sowing	None .	None. Women that own land hire workers or get their partners to complete this task.
Task B: *Deshije* (weeding)	None.	None. Women that own land hire workers or get their partners to complete this task.
Task C: Fumigation	None.	None. Women that own land hire workers or get their partners to complete this task.

Harvest		
Summary of activities	Farm activities: harvest, desmane (separation of plantain bunches), washing, selection, first packaging, transportation to *Maquilas*.	
PepsiCo's current involvement	No involvement/no agronomic support	
Task	**Women's role on:** **Large Male-Owned Farms**	**Women's role on:** **Associations and Woman-Owned Farms** *(2 women with direct contract holders, 18 women that are in associations)*
Task A: Harvest	None.	None.
Task B: Sorting, washing, and packaging	Some women participate in washing and disinfecting the plantains before packing them in sacks, to be sent to the *Maquilas.*	Will lead the washing and disinfecting of plantains before sending to *Maquilas*.
Task C: Administrative tasks and feeding workers	Women support large producers in administrative matters.	Women support associations through operations, logistics, accounting, and clerical work.

Task D: Transportation to *Maquilas*	None.	None. Women hire male drivers that lift the plantain into the truck.

Processing	
Summary of activities	*Maquila* activities: second washing, peeling process, final washing, second packaging, transportation to PepsiCo's plants.
PepsiCo's current involvement	No involvement/no agronomic support
Task	**Women's role on all *Maquilas***
Task A: Peeling	About 90% of all green plantain peeling is conducted by women
Task B: Administration and organization of *Maquilas*	Participate in accounting, hiring of personnel, logistics, management and monitoring of marketing contracts, etc.
Task C: Transportation to PepsiCo	None.