



Coffee Learning Paper

Working with the private sector for pro-poor growth in the coffee sector

Market Development Facility
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Market Development Facility

Market Development Facility is an Australian Government funded multi-country initiative which promotes sustainable economic development, through higher incomes for women and men, in our partner countries.

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Glossary and Abbreviations

Aggregators	Agricultural businesses or cooperatives of growers that consolidate and distribute agricultural products. They typically support regional growers of diverse sizes and experience and sell products to local or regional markets.
<i>Beauveria bassiana</i>	An entomopathogenic fungus used as an insecticide to control various plant pests.
CBB	Coffee berry borer. An insect found around the world and prevalent in most coffee-producing countries.
Cherries	The coffee cherry is the fruit of the coffee plant. It comprises skin, flesh, and the coffee bean.
Cupping scores	Cupping scores, developed by the Specialty Coffee Association, are scores from 0 to 100 assigned to a cup based on an evaluation of the brew. Coffee that scores 80 points or above gets the 'specialty coffee' badge of honour—commercial-grade coffee scores from 60 to 80.
Coffee cupping	Coffee cupping is a process whereby freshly roasted beans are steeped in hot water and then evaluated by coffee producers, buyers, and Q graders (cupping professionals) for aroma, flavour, aftertaste, acidity, body, balance, uniformity, 'clean cup' (untainted), sweetness, and defects.
Fly crop	A second smaller harvest that is in opposition to the main crop harvest. It yields smaller amounts of harvest, and the quality can be lower.
Green beans	The seeds of coffee that have been separated from the flesh or fruit and are yet to be roasted. Coffee's taste and flavour potential are held within this green seed.
Micro-lot	A term used by many in the coffee industry to refer to small, exclusive, and traceable lots of coffee.
NASAA	National Association for Sustainable Agriculture, Australia. This entity plays a critical role in supporting and promoting the adoption of sustainable agricultural practices that lead to safer and more sustainable food production systems.
Parchment coffee	Part of the coffee bean that has been removed from the outside of the rice crust (cherry) but has not had the protective paddy peel removed. Parchment coffee is an intermediate stage in the preliminary processing of coffee beans. Parchment is the cellulose layer that protects the coffee bean and resembles parchment paper when dried.
Provenance	The provenance of coffee refers to the origin or source from which it comes and the history of subsequent operations (supply chain). It gives consumers an understanding of how coffee has been produced and transported.
Roasters	A place or person who roasts coffee in preparation for use. Also, a machine or rotary cylinder used to roast coffee beans.
SMEs	Small-medium enterprises.
Strip-picking	All coffee cherries are picked from the tree at the same time with machinery regardless of the maturity and quality level.
Trading house	Trading houses act as agents for foreign sellers or buyers seeking new markets for products and services. It may also refer to a firm that buys and sells commodity futures and physical commodities for customers and their accounts.
Traceability	Traceability is the ability to share information about and follow the movement of an agricultural product through all or part of its supply chain across the production, processing, and distribution stages.
Units of measurement	Carats to pounds (ct/lbs) conversion of 1 carat to 0.0004 pounds is a unit for measuring coffee prices.

Summary

Papua New Guinea is well placed to supply coffee to Europe, and the Asia-Pacific region where demand is growing. PNG has a history of coffee cultivation, its climate and terrain are conducive to growing coffee, and its harvesting season means that bags will land in European markets at an optimal time in the production/ buying cycle.

However, it struggles to shift from selling mainly low-grade coffee in low-value markets to producing high-value specialty coffee. Sourcing is constrained by remoteness, inadequate transportation systems, and law and order issues that inhibit the movement of produce to the market. In addition, smallholder farmers are under-served by agricultural extension services.

From 2017 to 2023, using a market systems development (MSD) approach and partnering with the private sector, MDF-PNG Phase II has played a part in influencing change in the coffee industry in PNG. It demonstrated that, with strategic investments in market functions, an industry can move from low-grade commodity coffee production to high quality specialty coffee.

Despite the positive shifts within the system, challenges such as the outbreak of a coffee berry borer (CBB) infestation and climate change will continue to affect the sector. Long-term investments in PNG's coffee supply chain, particularly in extension services and traceability, are necessary to support the shift to a sustainable, high value coffee industry.

This paper explores the lessons MDF learned from working in the coffee sector.

What we learnt



PNG's coffee exports need to shift to high-value products

The high cost of production in PNG, compared to larger producers such as Brazil and Vietnam, means that it is noncompetitive in low-value, high-volume coffee markets. PNG can better compete in international markets by shifting from selling low-grade coffee to higher-grade coffees. The associated higher prices ensure coffee businesses can maintain margins and still invest in training, processing, certification, finance, and information for farmers.



Agricultural extension services need to focus on market preferences, not just on productivity

Productivity or efficiency enhancing practices, such as the use of synthetic inputs e.g., pesticides and herbicides, or strip-picking coffee beans can limit access to high value markets, such as those with organic or environmental preferences. Intermediaries and exporters can provide information based on market preferences to ensure that farmers are adopting the right practices to maximise value.



Finance needs to be available and at the right time

Coffee supply chains need sufficient liquidity to buy beans from farmers when crops are ready. This puts financial pressure on local coffee aggregators and traders who often get paid by processors and exporters well after coffee has been exported. Banks are unwilling to extend loans using coffee stocks as collateral. MDF showed that a revolving fund operated by exporters could increase liquidity and reduce banks' perceptions of risk, therefore encouraging the entry of financial institutions into the sector.



Climate change is affecting the coffee sector in PNG

Crop cycles, risks, and opportunities are changing due to climate change. Certain crops can now be cultivated at higher altitudes and some pests are thriving in the warmer climate. This volatility will buffet coffee, and farmers will need support to adapt and diversify to protect their harvests and livelihoods. At the same time, high value markets are also beginning to demand carbon-verified coffee.



The MSD approach worked well in PNG

MDF faced issues of thin markets and few market actors in the coffee sector. Its approach was to work with large exporters to improve their supply chains and ensure a consistent supply of high-quality produce that would attract premium prices. These exporters reached up the supply chain to multiple processors, aggregators and ultimately farmers, seeing innovation and benefit flow.

PNG Coffee

Coffee is the second largest agricultural export in PNG after oil palm, accounting for around one per cent of global production.¹ Approximately 2.5 million people are involved in the coffee business² producing and exporting 847,000 bags³ of green coffee in 2022. Unlike PNG's extractive industries, coffee is domestically driven, encompassing a broad network of actors from farming villages to traders, truckers, bankers, and exporters in provincial centres, to overseas markets.

Coffee plays a vital role in the economy of the Highlands region. Any changes in the coffee sector affect every other part of the economy.

Despite its remoteness from major consumer markets in Europe and North America, PNG is well situated geographically to serve emerging and expanding markets due to the coffee harvest schedule. PNG-washed coffee is produced in tropical highlands environments from May to October and delivered to Europe during the winter months of December to March.

PNG has an ideal agroecological environment for producing quality Arabica and Robusta coffees. Arabica varieties, such as Arusha, Blue Mountain and Typica, account for 95 per cent of production.⁴ Arabica coffee is grown inland at high altitudes, and Robusta is produced in the lowlands. These coffees are known for characteristics of great acidity and pleasing aroma. Strong global demand and high prices are increasing interest in coffee production. Niche buyers are seeking high-quality coffee that is sustainably sourced and traceable.



When coffee was introduced 85 years ago into the Highlands, tribal fights largely stopped. Coffee transformed the Highlands' economy and changed rural people's way of life. Whole communities were producing coffee on their own land or working in plantations to earn an income. This led to the cessation of tribal fights in Western Highlands Province, Eastern Highlands Province, and Simbu. The peace lasted 50 years.

Jim Leahy (2020), a second-generation coffee planter.

¹ Coffee Industry Corporation Ltd, History of Coffee in PNG www.cic.org.pg, 2023.

² Papua New Guinea Coffee Market Study, Pacific Horticultural & Agricultural Market Access (PHAMA) Plus Program, 2018.

³ Coffee Industry Corporation Ltd (ibid).

⁴ Coffee Industry Corporation Ltd (ibid).



Understanding the PNG coffee sector

Smallholder farmers produce the bulk of PNG's agricultural commodities on customary land. The exceptions are oil palm, poultry, and industrial sugarcane. These farmers produce on a low scale, and have few resources to invest in their enterprises. They operate remotely from markets, selling to aggregators, and they rely on traditional farming knowledge and information.

The competitive position of PNG coffee has declined over the past 30 years. As a result, about 30 per cent of land dedicated to coffee growing was withdrawn in three central coffee provinces and reallocated for other crops and peri-urban piggeries. In 2022, the returns on labour from smallholder crops⁵ showed that coffee was returning around PGK 14 (USD 4) per person per day, while vanilla, kava, betel nut, oil palm, tomato, carrot, sweet potato, balsa, and nutmeg all returned over PGK 40 per person per day.






Block and plantation operations were the mainstays of the coffee industry after PNG's independence in 1975. These large landholdings produced high quality and marketable coffee for almost two decades. The Coffee Industry Act 1991 supported and favoured the block and plantation model. However, its competitiveness declined due to rising production costs and insufficient government budgetary support. In 2013, the Coffee Industry Corporation, the sector's regulator and apex organisation began giving restricted export licences to smallholder operations (Simbiken, 2001).⁶

Overall, the national exportable crop has declined from 1 million bags to around 750 000 – 850,000 bags (60 kg green) annually. (For current volumes, see Annex 1).

While pests, climate change, input costs, and infrastructure have affected the viability of the coffee sector in PNG, it also faces challenges in sourcing coffee from remote areas. These are set out in Table 1.

Table 1: Challenges of sourcing coffee from smallholder producers

Challenges to sourcing coffee

	Transport infrastructure	Coffee producers in remote villages of PNG can walk for many days to get to a road and transport from the road head to a buying point is expensive.
	Law and order	As a higher-value commodity, coffee can be a target for theft from the field or during delivery to markets. The law and order environment is weak and cash carried from the market back to villages can be subject to robbery.
	Producer knowledge of improved production and post-harvesting practices	Coffee producers need knowledge of best practices and new information about production, productivity, and post-harvest management. They produce commodities lacking quality and provenance characteristics highly sought by higher-value markets.
	Access to markets	Remotely located smallholder farmers lack access to markets that will pay premium prices for quality differentiated products.
	Delivery and outcome of extension service	Smallholder farmers are active in multiple enterprises; they are mixed farmers of various crops for the household and the market. Therefore, it is difficult for them to change production practices based on technical advice specific to a single product.

⁵ Returns on labour inputs to smallholder for cash crops in Papua New Guinea; R. Michael Bourke; ANU Development Policy Centre; Policy Brief 23; December 2022.

⁶ Dr Neslon Simbiken, <https://dpa.bellschool.anu.edu.au/news-events/podcasts/audio/5087/past-present-and-future-coffee-industry-papua-new-guinea>.

Since the collapse of block and plantation operations, coffee exporters have sourced from smallholders. Over time, they have developed supply chains from remote regions, but at low margins, stretching their resources. Exporters and government have struggled to provide extension services to remote coffee farmers due to the cost and difficulty in reaching them. As a result of these challenges, coffee production has declined, and exports have struggled to remain competitive. Exporters have

been unable to capitalise on the world demand for high-quality coffee, as the disparate smallholder networks do not have sufficient capacity to produce it. Exporters can only buy commodity-grade coffee which has low margins so they have limited resources to invest in their supply chains, e.g., by providing regular extension services and inputs. In turn, farmers are receiving low prices for their coffee beans with no means to improve their situation.



The PNG coffee supply chain

In PNG, most coffee passes through a network of independent intermediary coffee traders. These traders may be coffee farmers who act as aggregators, buying from other farmers. The intermediary will negotiate with exporters to supply green coffee according to grade, quantity, and price. They are either self-financed or financed by the exporter.

Buyers of predominantly parchment coffee (i.e., dried but unhulled beans) will buy whatever is available; they are not seeking specifically high-quality beans and will mix good and poor quality beans. This is also the case for roadside cherry buyers who buy and combine cherries of various qualities. Neither buyer keeps provenance records.

Green coffee is ideally processed by aggregators in 'wet mills' where the green cherries are separated from floaters (coffee with defective beans that float) and debris and are washed. Some processors function as 'toll millers', i.e., they provide milling facilities for a fee or toll.

These washed green beans are further refined by exporters in their processing facilities to produce export-ready coffee. These cleaning processes are carried out to add value and contribute to quality improvement; however, to produce top quality coffees (a Q grade cupping score of 85+), more disciplined processes at the farm level are required, such as better selection of the beans collected and improved washing and drying processes.

PNG will only be able to tap the premium or specialty markets once these processes are improved. Ideally, value will come from pre- and post-harvest improvements at the farm level, better-functioning supply chains, traceability, and certification. Traceability refers to knowing a coffee's origin, essential to coffee consumers

concerned about authenticity, environmental practices, and ethical trade. Certification is a means to confirm that coffee meets organic, fair trade, and other standards and will attract higher prices. Intermediaries must play a significant role in assessing quality characteristics to maintain these standards.

In a typical traceable supply chain, documentation is required at all levels to describe and validate the provenance of each supplier's coffee so that consumers can be sure of where their cup of coffee has originated, e.g., Blackstone Coffee from Chimbu province, or Kenta in the village of Kenta, near Goroka in the Eastern Highlands. Intermediary traders do not always keep



Cherries, berries, and beans



A coffee bean is actually the seeds of a cherry-like fruit. Coffee trees produce berries, called coffee cherries that turn bright red when they are ripe and ready to pick. The bean is at the core of the cherry.

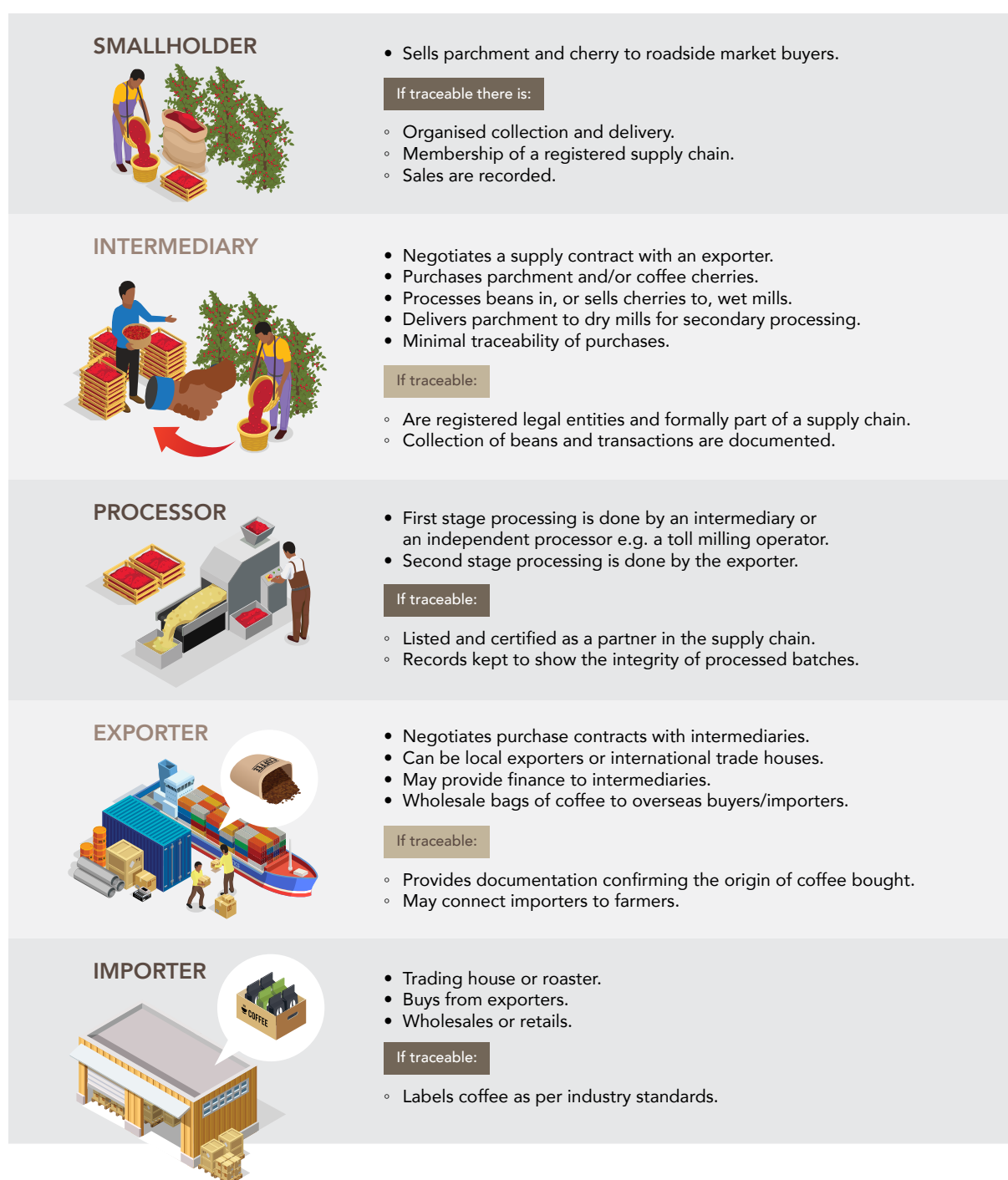
buying records or disaggregate them for each farmer, which is required in a traceable supply chain.

The actors are the same in traceable and untraceable supply chains, but they behave differently. In a traceable supply chain, actors have formal contractual relationships, and exporters and intermediaries maintain records of sales and purchases for each farmer. Greater regulatory

control of intermediaries by the government would assist in ensuring the integrity of coffee derived from each actor along the supply chain.

Figure 1 shows the coffee flow, the various actors' roles within a supply chain, and describes the characteristics of traceability.

Figure 1: Traceability in a coffee supply chain





Climate change and coffee markets

Climate change has brought higher and more intensive rainfall, temperature increases, and a rise in humidity levels. There is a potential for increased incidence of drought and extreme weather events. An advantage is that land at higher altitudes may become suitable for coffee, but the cost is that current growing areas at lower altitudes may become unviable.

At the farm level, temperature rises have affected flowering, fruit development, and harvest seasons, which have become less distinct. Farmers have reported that the harvesting season is longer, and more crops can be produced. The unsynchronised flowering of the coffee plant is the direct effect of the absence of a distinct dry season (i.e., the impact of non-seasonal rainfall). This has already caused an increase in the incidence of off-season crops ('the fly crop'), which come in December, from 2 per cent of total national crops to around 5 per cent. Pests such as CBB and leaf rust thrive in the warmer moist climate.

Farmers must prepare for these effects by upgrading drainage, improving sanitation practices, better crop protection, and adapting to soil quality and composition changes. In addition, access to farms may become more difficult with the higher rainfall. A longer season may require more labour, and sales schedules will need to be adjusted.

At the processing level, longer fermenting and field drying times will be required. Higher humidity at altitude will affect storage life. Changes in quality and cup profiles will impact marketing. In addition, road and transport infrastructure conditions to factories and ports to meet nominated vessels will be affected.

Not only physical risks from climate change threaten the coffee sector. As consumers become more conscious of the environmental impact of their coffee consumption, and economies enforce measures to reduce carbon emissions, coffee sector actors will need to find ways to reduce emissions and verify these reductions along the supply chain to maintain access to markets.





Pest and disease pressure

Pests and diseases are significant threats to the PNG coffee industry. CBB is destroying crops in Jiwaka, and Western and Eastern Highlands and has reduced yields, prices, and income. Yield losses from CBB are reportedly 30-35 per cent in some cases. Temperature rises from climate change have aggravated the problem. Coffee growers at lower elevations have reported high levels of CBB infestation.

CBB are managed by labour-intensive farm sanitation efforts and pheromone traps, an effective but expensive

means of destroying the pest. Both methods are designed to interrupt the pest's lifecycle. Any methods used need to be economically viable, sustainable, and environmentally friendly. If no action is taken, smallholdings in CBB hotspot areas may be phased out or the entire industry devastated.

With increased humidity, a re-emergence of coffee leaf rust is likely. This fungus made its first appearance in 1985 and caused significant damage to coffee crops.



The emerging high-value niche

International consumers are prepared to pay a premium for high-grade, certified coffee products. As a result, there is pressure on supply chains to demonstrate fair remuneration to growers, environmental compliance, and conservation efforts.

Some exporters are seeking coffee beans that meet the standards for high-value market segments. However, developing supply chains for high-quality certified coffee products in PNG requires considerable investment in extension services and traceability back to smallholder villages. These costs are prohibitive for many exporters, given the low-margin commodity export supply chains in which they are working.

Improving the Coffee Sector

There are 50 coffee-exporting countries⁷, and PNG ranks at 17 in terms of sales volume. PNG produced and exported 847,000 bags of green coffee in 2022. The volume out of PNG is minuscule compared to Brazil, Vietnam, and Colombia, which rank first, second and third, respectively.

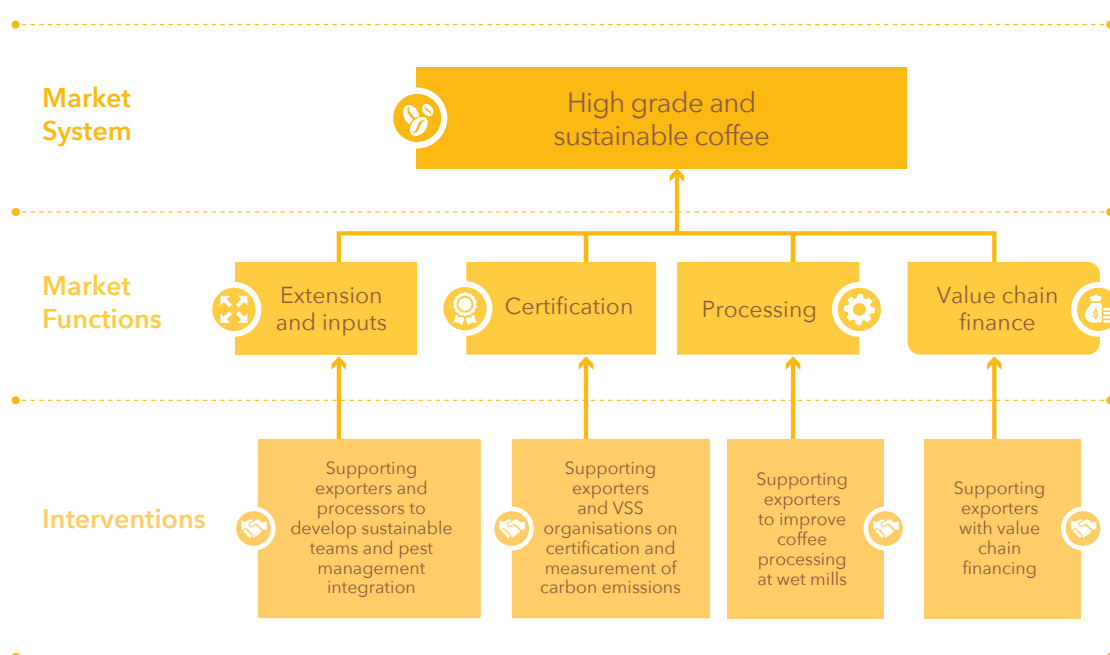
The costs of sourcing coffee are high in PNG, given its location and the remoteness of its farmers. Therefore, selling volumes of low-grade coffee is uneconomical and difficult to sustain. As global coffee consumers shift their preference towards specialty coffees, producing these premium coffees can offer the sector far greater returns.

It is estimated that the value of the global specialty coffee sector will reach USD 152.69 billion by 2030, which represents a growth rate of 12.3 per cent per annum during that period.⁸ PNG coffee has the potential

to tap into this market and benefit if it improves quality, gains the proper certification, and adheres to traceability standards.

Through its sector analysis, MDF identified that some actors in the industry had begun to shift to supplying the high grade or certified coffee segment (see Annex 1 for coffee grades). MDF-PNG adopted this high-grade, sustainably produced coffee strategy to accelerate a shift in the coffee market system, working in partnership with prominent coffee exporters and small-medium enterprises (SMEs). The program worked in extension, certification, processing, and finance market functions. Figure 2 shows the linkages between the strategy, market functions, and interventions. Outside these main functions, MDF also piloted interventions on coffee marketing, carbon emissions calculations, and pest control.

Figure 2: Market system hierarchy for high-grade and sustainable coffee



⁷ <https://worldpopulationreview.com/country-rankings/coffee-producing-countries>

⁸ <https://perfectdailygrind.com/2022/12/is-specialty-coffee-growing-faster-than-consumption/>



Interventions with partners

Based on the sector strategy to increase production, quality, and provenance certification of coffee beans produced by smallholders, MDF formed partnerships with local companies to support and de-risk innovations that would enable coffee farmers to improve their livelihoods. These interventions aimed at improving critical market functions necessary to support the shift to high grade and sustainable coffee. These partners were Kosem Coffee

Ltd, Monpi Coffee Exports Ltd, Niugini Coffee Tea and Spices (NCTS), New Guinea Highlands Coffee Exports (NGHCE), Outspan Coffee, Sucafina Coffee, Fairtrade, the National Association for Sustainable Agriculture Australia (NASAA) Certified Organic, and smallholder coffee producers. The interventions implemented, and changes observed, are described below.



Improved smallholder coffee quality and production

Supporting coffee aggregators and exporters to develop relationships with smallholders formed a significant part of MDF PNG's coffee portfolio. These relationships were foundational for improving productivity and crop quality achieved through training, field extension services and giving small infrastructure such as washing machinery and raised drying beds. As a result of building this trust, supply chains like Riverside Mill and Blackstone Coffee now consistently produce and supply good quality coffee.

MDF worked with coffee businesses by de-risking investments in extension teams to serve their smallholder farmer supply chains and improve the provision of information and inputs. Coffee exporters such as NCTS and Monpi Coffee Exports Ltd hired extension officers to train farmers on good agricultural practices.

These investments saw significant returns for both farmers and coffee exporters. Larger businesses continued to maintain and expand their extension networks. Smaller exporters who could not establish their own teams, started to use service providers so their farmers had access to information. MDF noticed exporters seeking efficiencies in extension, shifting from expanding their own hired extension teams to leveraging existing relationships between farmers and aggregators or incentivising lead farmers to provide information to other farmers. This is a promising sign for the ongoing sustainability of extension services.



Sourcing and certification

Certification of the higher-quality coffee supply chains presented an opportunity for PNG coffee to tap into niche, high-value markets. Several well-recognised certification programs have emerged in recent years, and certified coffee traders are attracting premiums for produce in international markets. However, the certification process can be difficult and expensive to manage, especially for smaller businesses. MDF initially worked with businesses to certify smallholder supply chains and these partners later invested independently to maintain their certification. Smallholder farmers were motivated to continue the good growing practices they learned in the certification process, encouraged by the prices they received.

In 2021, MDF worked with certification bodies Fairtrade Australia and New Zealand and NASAA to enhance the benefits of participation and expand markets. These partners explored ways for farmer groups to access services and harmonise certification requirements to reduce compliance and reporting burdens.



Supply chain strengthening

At the processing level, well-managed wet mills set up in strategic locations can purchase sizable volumes of cherries. A-Grade coffee uses modern processing techniques to comply with buyer requirements and certification standards at all stages, from cherry selection to fermentation, washing, drying, storage and handling.

MDF worked with NGCHE to invest in improved coffee processing and drying for two of its aggregators, the Kenta and Riverside coffee mills. Drying infrastructure, water pumps and better machinery improved the quality and quantity of coffee sourced from these mills. With this consistent flow of high-quality coffee, NGHCE explored further innovations in coffee roasting to capture more value from its coffee. Further investment is required to expand the number of wet mills.



Value chain financing

The coffee sector has a liquidity problem in that buyers have insufficient cash during the harvest season to buy farmers' crops. Banks are reluctant to lend to the sector and when they do, the terms are expensive and onerous. This is particularly challenging for certified supply chains; if the buyers do not have the means to pay for coffee, farmers are forced to sell their high-value coffee at lower prices to whichever traders have cash.

To introduce more liquidity, MDF piloted a revolving fund with exporters enabling them to maintain coffee buying within their supply chains. When repaid, the funds were recirculated as required. Exporters adapted these funds to their working capital needs, with some revolving the fund just between the aggregator and processor and others using it across their supply chain. Several exporters put more money into their revolving fund during the season or set up funds for additional supply chains, independent of MDF's support. MDF offered this model to other buyers.



Marketing

PNG coffee exporters are linked to the global supply chain and have markets for the coffee they source. However, many SMEs are supplying niche specialty coffee markets. MDF supported these businesses to establish market linkages through participation in events like the Melbourne International Coffee Expo and domestic events and trade fairs, allowing them to showcase their products. The network and market linkages built through participation in these events helped SMEs increase their sales opportunities and understand trends in the coffee sector.



Calculating carbon emissions

With coffee markets demanding verification of carbon emissions, MDF partner and exporter, Sucafina Coffee developed a carbon calculator to determine the greenhouse gas emissions from its supply chains. This will help them to supply to niche and value-added markets that require evidence of emissions levels from production. Sucafina can now sell carbon-verified, deforestation-free coffee.

To reduce and mitigate emissions, where viable, further investments could be made in renewable energy for coffee fermentation and mill processing, improving wastewater treatment, efficient transportation, and adapting resource conservation methods.



Pest control

To help farmers manage the impacts of the CBB outbreak MDF partner Monpi Coffee Exports Ltd educated and equipped farmers with tools and traps and accurate information.



Evidence of Change

From 2018-2022, MDF worked with eight coffee partners in **17 interventions/projects**. It invested **USD 992,681**, and its partners invested **USD 636,204** in the projects resulting in:



13,917 farmers benefitted from interventions – **1,749** women and **12,168** men.



An additional **42,000** bags of coffee were sold.



Additional income to smallholder farmers was **USD 876,744**, or USD 20.00 per bag.



The value of additional market sales was **USD 2,741,788**.



Farmers who participated in supply chains **supplied better quality coffee** than those who did not.



Exporters **invested in traceability systems** by establishing or increasing extension teams and digitising supply chain information.



Intermediaries or processors that supply high-quality coffee to exporters **increased their investment in, and capacity of their businesses, to source quality coffee**.



Export figures (Annex 1) show **a trend towards quality coffee exports**.



Price incentivises farmers to work with exporters to invest in higher value crops, improve farming practices and build robust supply chains for certified, quality coffee to fetch premium prices.

What did we Learn?



PNG's coffee export sector's competitiveness relies on high-quality products

Even though two and a half million Papuans benefit from coffee production, PNG is not competitive in low-cost high-volume coffee due to the high cost of production and needs to shift to higher grade coffee. This requires more investment, but brings higher returns to supply chain actors. It is appropriate to concentrate on increasing productivity and adding value to coffee supply chains. There is significant potential for developing micro-lot specialty coffee supply chains, examples are Kenta, Riverside and Blackstone, where farmers rely on a dependable supply chain to market and fetch a premium price.

Exporters have a role in offering better prices and engaging with farmers through extension and training to commercialise smallholdings and produce consistently high-grade coffee. However, certification requirements are time-consuming and costly for farmers, so exporters must find markets that will compensate producers for their investment in gaining certification. In addition, certification bodies can look for efficiencies to reduce compliance costs.

The government's role in boosting competitiveness would necessarily shift from providing extension services to farmers to supporting the private sector through e.g., improving in improvements to the business-enabling environment.



Extension needs to focus on market preferences, not just productivity

Farmers need knowledge and information to improve their crops. Coffee buyers benefit from access to a reliable, high-quality, and certified raw material source. As a result, they have clear incentives to invest in smallholders to improve their production practices and access markets. Intermediaries and exporters also provide inputs, traceability, certification, and finance to participants in their supply chain as they have a clear

understanding of market requirements. Productivity or efficiency enhancing practices, such as the use of synthetic inputs or strip-picking coffee beans can lower quality or limit access to markets with organic or environmental preferences. Intermediaries and exporters can provide information on market preferences that ensures farmers adopt the right practices to maximise value.





Finance needs to be available and at the right time

Supply chain finance plays a vital role in the shift to high-value exports. In PNG, exporters need access to funds at critical times in the harvesting cycle to buy all available coffee from farmers. There are financial institutions that are willing to supply funds. However, exporters cannot meet the collateral requirements and high interest rates. Warehouse financing would allow finance to be secured against export-ready coffee or

supply contracts, but this type of facility is not available in PNG. Instead, MDF co-invested in a revolving fund with exporters to make loans available during the coffee buying period. This demonstrated to banks that exporters were credit-worthy and given that the coffee market has low volatility, financial institutions could introduce suitable lending products.



Climate change is altering the crop mix in PNG

MDF observed significant changes in crop types produced commercially by farmers in the Highlands of PNG in 2022. Previously grown at lower altitudes, coffee, vanilla, and other crops are now being propagated in commercial quantities at higher (formerly cooler) altitudes. The effect was pronounced in Jiwaka province where Arabica coffee grown in low lying areas has been badly affected by CBB which is thriving in the warmer climate. Farmers also pointed to more frequent flowering cycles in Arabica coffee.

As these trends accelerate, donors, government, and private sector investment will be required to support smallholders and agribusinesses to adapt and diversify their crops, install, and maintain better drainage systems to cope with intense rainfall, and prepare for increased humidity that will affect fermenting times and storage.



The MSD approach used by MDF worked well in PNG

Development programs face challenges in PNG because there are a limited number of market actors to work with, high cost of operations, and constraints in mobility. Consequently, MDF had to work with the same actors through multiple partnerships, as well as replicate innovations with multiple partners to stimulate interest in further investment from the sector.

MDF's approach in the coffee sector was to work with large exporters who were motivated to improve their supply chains to receive a consistent supply of high-quality produce and premium prices. These exporters reached up the supply chain to processors, aggregators and ultimately farmers, benefitting the entire supply chain.

MSD is suited to the PNG environment because it intervenes wherever and whenever action is required to effect change in a market system in contrast to development modalities used to support the private sector that focus on one area of the market system. Future MSD programs can scale up successful interventions by facilitating supply chain development and institutionalising exporter-operated extension services.



Annex 1

Global Coffee Prices, Trends, Grades and Exports

In 2022 the New York Futures (ICE) spot price remained consistently above 180 carats/lb (see Figure 3), with February 2022 seeing a ten-year high of 258 carats/lb.⁹ These higher prices could be attributed to the following factors:



A frost and drought in Brazil brought a drop in production in 2021, contributing to a drawdown on certified stocks and the lowest reserves in over two decades.



Global production for the coffee year 2021/2022 of 167 million bags, while consumption reached 170 million.



COVID-19 pandemic issues affecting global supply chains and causing inefficient delivery and higher freight costs.



The war in Ukraine contributed to higher fuel and food prices worldwide.

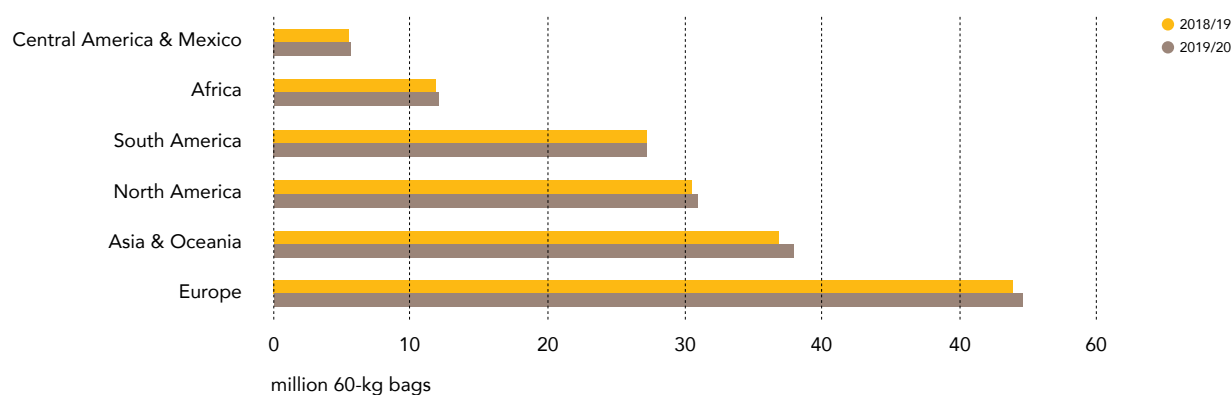
Figure 3: ICO coffee indicator price¹⁰



Coffee consumption trends from 2018 to 2020 showed growth in Asia and Oceania (see Figure 4). In 2019 China and Vietnam's consumption rose by 10%, followed by Indonesia and Korea with approximately 6% growth. Globally, Asia and Oceania are the second most extensive consumption regions.

⁹ Carats to pounds (ct/lbs) conversion of 1 carat to 0.0004 pounds is a unit for coffee prices.

¹⁰ International Coffee Organisation (ICO); Trade Statistics.

Figure 4: Annual coffee consumption

Grading systems

This table shows how the quality of coffee is rated. This is done through coffee cupping, a process whereby freshly roasted beans are steeped in hot water and then evaluated by coffee producers, buyers, and Q graders (cupping professionals) for aroma, flavour, aftertaste, acidity, body, balance, uniformity, clean cup, sweetness, and defects—the graders then assign a ‘cupping’ score.

Table 2: Coffee classifications and grades

Specialty Coffee Association Classification			PNG Grading Standard			
Grade	Quality description	Max allowed defects/ 300g	Grade	Quality description	Max allowed defects/ kg	Size
1	Specialty coffee. The beans and cup must pass a rigorous review. Consistent size beans, and must exhibit uniqueness in one or more attributes of taste, acidity, body, or aroma.	3	A	Full, reasonably balanced, uniform, clean cup; well-pronounced body and acidity; rich and distinct fragrance and aroma.	10	18+
2	Premium coffee. Like Grade 1, it uses high-quality beans, but up to eight full defects are permissible.	8	B	Regular, uniform, clean cup; medium to high acidity and pronounced body; rich fragrance and aroma.	30	17+
3	Exchange grade coffee.	9-23	Y	It may lack some uniformity in the cup; good acidity and body; some fruit or wine character; good fragrance and aroma.	70	15+
4	Below standard-grade coffee	24-86	Y2	Irregular cup profile; fair acidity and body; no foul or foreign off flavour.		15
5	Off-grade coffee is the lowest quality coffee.	More than 86	Y3	No foul or foreign flavour.		14+

¹¹ Source: <https://sucafina.com/na/lp/grading-in-png>



Grades of coffee exported

Total coffee exports in 2022 are compared with exports in 2000 in Figures 5 and 6. Compared with grades exported over the last 22 years, these show evidence of a significant trend towards exports of better-quality coffees. For example, Y-grade coffee exports were reduced by 18%, B-grade increased by 13%, and A-grade coffees increased by 8%. This encouraging quality shift demonstrates that a transition to improved coffee is underway.

Figure 5: Exports by grade 2022 (Jan-Sept)

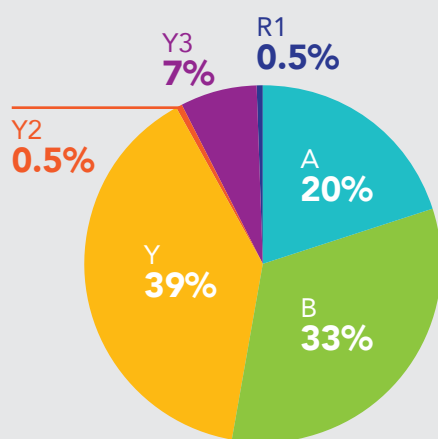
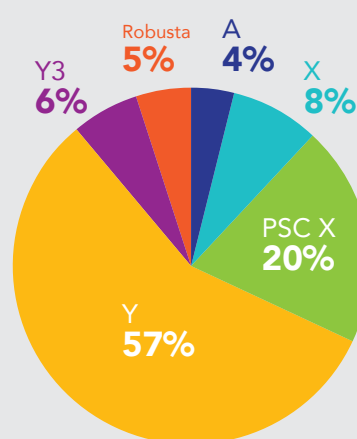


Figure 6: Exports by grade 2000 (full year)



Certified coffees

During the 2020 coffee season, certified coffee exports comprised 87,541 bags or 13% of total coffee exports (Figure 7). UTZ Certification was the certification body with the highest volume and comprised 43% of all certified exports. Fair Trade Organic comprised 31% of all certified exports, while Organic comprised 18%.

From January to September 2022, exports of certified coffees (Figure 8) were 20% of total exports. This is a 7% increase in certification market share from 2020. The increase in dual certifications is also notable.

Figure 7 and Figure 8 compare certified coffee exports in 2020 with 2022.

Figure 7: Certified exports - January-September 2020

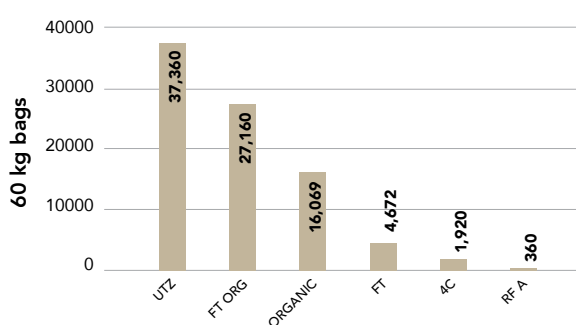
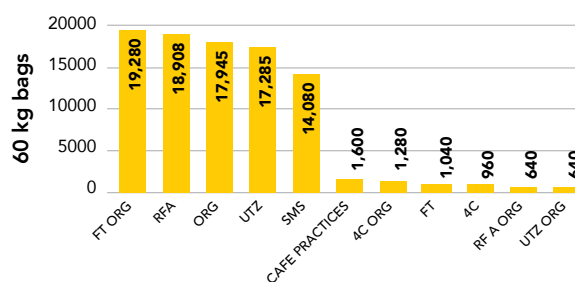


Figure 8: Certified exports - January-September 2022



Total certified exports: 95,658

Export destinations

Figure 9 and Figure 10 compare coffee export destinations in 2020 and 2022. They show that PNG export destinations have remained essentially unchanged over that period. Most commodity and Y-grades are shipped to Europe, and many quality and specialty grades are shipped to the United States and Japan. Australia remains a small market, taking only 15% of PNG's total volume. Less than 1% (3,840 bags) were shipped to the Middle East.

Figure 9: Export destinations 2020

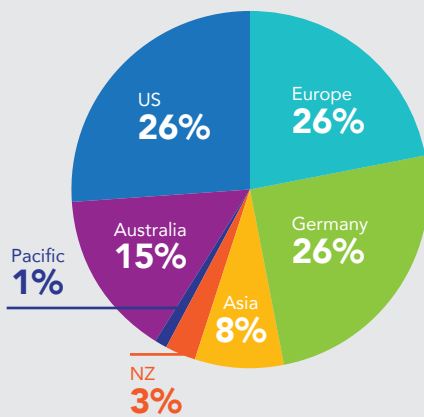
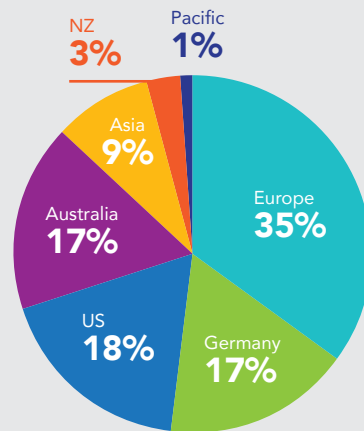


Figure 10: Export destinations 2022



The Australian market for PNG has changed considerably as the largest green buyer, Nestle, reduced its PNG usage. Nevertheless, the overall market share of PNG coffee supplies into Australia is 5%. The largest volume of green coffee imports into Australia are from Brazil (19%) and Columbia (15%).






PNG coffee's international trade performance in 2022

The higher international coffee prices shown in Figure 3 helped the PNG coffee industry in several ways. High prices during the harvest months (May-July) ensured healthy returns for farmers. Farmers received PGK2–2.50 per kg for cherry and PGK8–10 per kg for parchment. Average green prices were PGK15–16 per kg for Y-grades and PGK18–20 per kg for specialty grades. These prices were buoyed by a high market and a strong demand for Arabica coffee and saw a continued inverted market and strong differentials.

For the first nine months of 2022, the total value of PNG coffee exports was PGK 467 million (Table 3). Coffee is traded predominantly in USD and provides much-needed foreign currency.

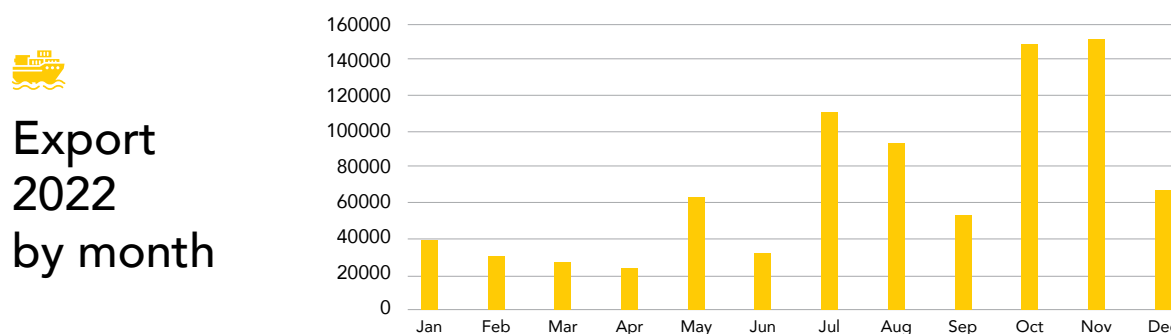
Table 3: Export summary by grade and value - 2022

Grade	PGK	% Value per grade
A	112,425,690	25%
B	162,162,843	35%
Y	172,212,169	37%
Y2	784,116	0.02%
Y3	18,981,625	4%
R1	411,840	0.01%



From January to December 2022, 26 businesses exported 847,000 bags. July through November saw 67% of total shipments exported (Figure 11). Exports during the first five months to the end of May totalled 183,000 bags, which would have been predominantly carryover crops from 2021. The unusually small export volume in September was due to shipping logistics issues.

Figure 11: PNG coffee exports by month - 2022



The four major exporters linked to international trade houses accounted for 70% of total exports. Thirteen midsize exporters, each exporting over 6000 bags, accounted for 28% of total exports, while small exporters exporting less than 6000 bags accounted for 2% of total exports.





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- Papua New Guinea: Level 10, MRDC Haus, Musgrave St, Port Moresby, Papua New Guinea
 - Fiji/Pacific Regional: Garden City Business Park, Grantham Road, Suva, Fiji
- Timor-Leste: 2nd Street, Palm Business & Trade Centre, Surik Mas, Dili, Timor-Leste
- Sri Lanka: No. 349, 6/1, Lee Hedges Tower, Galle Road, Colombo 03, Sri Lanka
- Samoa: Pat Ah Him Building (Nia Mall), Unit 20, Second Floor, Saleufi St, Apia, Samoa

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