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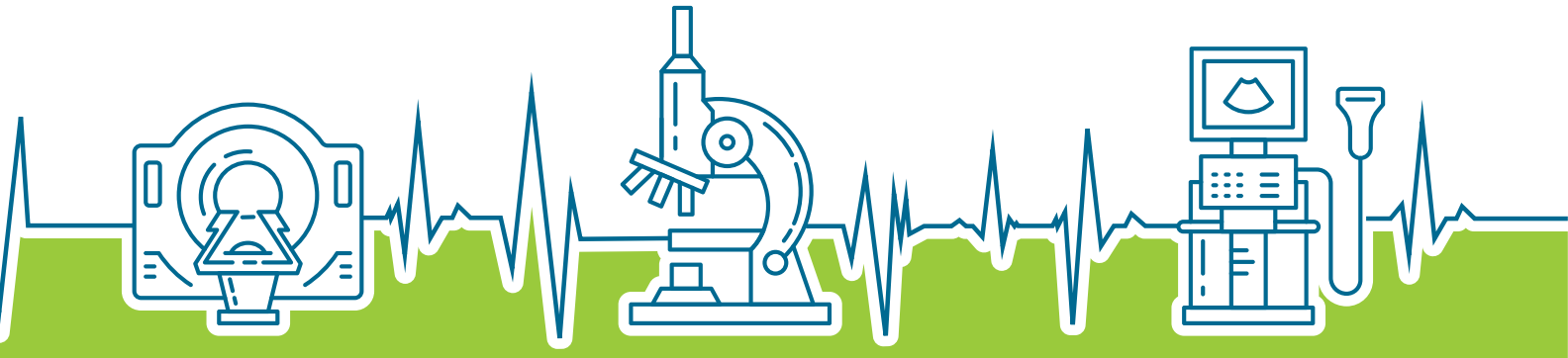

MARKET **ANALYSIS** OF **MEDICAL EQUIPMENT** FOR **CLINICAL LABORATORIES** IN **PAKISTAN**

AVAILABILITY OF AND NEED FOR FORMAL FINANCING

APRIL 2019

MARKET ANALYSIS OF MEDICAL EQUIPMENT FOR CLINICAL LABORATORIES IN PAKISTAN

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Authored by IQVIA.

Design and Layout by **Yasir Farhan.**

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EXECUTIVE SUMMARY

Health is one of the major determinants of wellbeing and welfare. Governments around the world have realized that policies aimed at enhancing social and economic inclusivity are incomplete without substantive targets for improvements in healthcare systems. This cognizance is reflected in international conventions like the United Nations Sustainable Development Goals (SDGs), and, in Pakistan's case, its national-level agendas such as Vision 2025 and the Multidimensional Poverty Index. In the context of healthcare, these development goals and targets are very pertinent in Pakistan's case because, in 2016, it was ranked 6th amongst 22 of the highest disease-burdened countries in the world.[1] Even though the trend in basic healthcare indicators has been on an upward trajectory, the pace of improvement and outcomes in the healthcare sector are sub-par.

Among its regional peers, Pakistan has one the lowest life expectancy ratios, along with a relatively high ratio of maternal and infant mortality. It is one of the three remaining countries with endemic polio and has the sixth highest tuberculosis burden. Furthermore, its healthcare benchmarks are among the lowest in the world - one doctor per 1,038 persons, one hospital bed for 1,613 persons, and one dentist for 11,513 persons. In the face of such poor indicators, the country's healthcare expenditure as a proportion of its GDP was a paltry 0.9% in 2014 compared to 3.1% by China, 2.6% by Sri Lanka, 1.4% by India, and 2.3% by Nepal.[2]

This report provides an in-depth analysis and evaluation of Pakistan's medical diagnostic equipment market for clinical laboratories that fall into the category of small and medium enterprises along with an assessment of the availability and need for formal financing. The aim is to provide financial institutions with insights that would allow them to design new financial products or tailor existing ones such that they are more responsive to demand and closely aligned with the financing requirements of small and medium enterprises operating in this segment.

The value of diagnostic services in the private sector in 2017 was estimated at USD 500 million–600 million with an expected growth rate of 15% CAGR over the next five years (2018–2023). Within the total market of about 225 million disease-prevalent cases,[3] secondary findings showed that about 40 million cases were undiagnosed even though they could afford a diagnostic test.[4] This is compounded by supply-limiting factors such as the population's ease of access to testing laboratories, which contribute to this major market gap. Pakistan's diagnostics service providers can focus on larger provinces, i.e. Punjab and Sindh where the market is underserved despite their significant potential. About 15 million cases in each of the two provinces are undiagnosed and yet can afford diagnostic tests. Clearly, there is considerable potential to enhance outreach. On the supply front, factors such as i) limited supply of equipment,

[1] Pakistan Economic Survey, 2016.
[2] World Development Indicators, World Bank, 2014.
[3] We calculated 225 million based on all potential communicable and non-communicable diseases that a patient may have, i.e. one person may have multiple episodes of illnesses during the course of a year.
[4] Diagnostic tests refer to pathology and radiology tests.

ii) limited number of private facilities to meet demand, iii) limited supply of people trained to use high-tech equipment, iv) qualified people's limited interest in living and working in relatively less developed areas, and v) limited infrastructure in rural areas—inconsistent electricity supply—are the major shortcomings that limit the provision of services. Initial assessments show that a huge potential exists for increased penetration of diagnostic services in private facilities, especially among patients who can afford to pay for such services.

Four distinct segments based on the level of service and geographic reach have been identified among the medical and diagnostics market players. These are categorized as the national players, regional players, and formal and informal local players in both the pathology and radiology service market. Table 1 shows the leading service providers for both pathology and radiology diagnostic tests.

Table 1: Leading service providers for pathology and radiology diagnostic tests

Segment	Key players (pathology)	Key players (radiology)
Informal local players	Individual players with only one second-hand routine chemistry machine (~1,500 players): Most of these labs do not have pathologists	Individual players with basic ultrasound equipment (800–850 individual clinics and more than 2,000 individual practitioners): General practitioners, gynecologists, cardiologists
Formal local players	Local players with comprehensive equipment setups for routine and semi-spec tests (40–60 players): Doctors Lab and Diagnostic Centre, Pride Lab, The Laboratory, National X-Ray and Diagnostic Center, Metro Lab, Al-Nasar Lab and Diagnostic Center, Hormone Lab, Arif Lab, Citi Lab	Centers with basic tech like x-rays, ultrasound equipment (40–50 centers, 300–350 hospitals): Doctors Lab and Diagnostic Centre, Sonex Imaging
Regional players	Laboratories with satellite labs/collection points (10–15 players): Shifa, Indus, Hussaini, Excel, Essa, Dow, Sindlab, Karachi Lab, Zeenat, Al-Nasar Lab, HumLab	Centers with advanced technology; CT scans, MRI (6–8 centers): Doctors Hospital and Medical Centre Lahore, Indus, Essa, Karachi Diagnostic Centre, Al-Noor Diagnostic, Al-Nasar Lab
National players	Top 3 players: Shaukat Khanum, Aga Khan, Chugtai Lab	Top 4 players: Shaukat Khanum, Aga Khan, Shifa International Hospitals, Islamabad Diagnostic Centre

The need for financing is very limited among pathology service providers due to the well-established reagent model of financing where reagents are purchased at an agreed cost per test, which varies with test volume. In the radiology market, diagnostics equipment is commonly purchased by service providers through private investment. Thus, there is a stronger need for financial support among regional and local players as they are well poised to extend their service

offerings. Considering the business potential of each player, regional players are expected to get a faster payback for their services than other players due to higher test volume and a stable customer base secured through corporate contracts.

An assessment of the market shows that the primary medical and diagnostic equipment market is very well-organized. It is dominated primarily by well-known multinational players that produce new or refurbished equipment that tends to have better technology and quality. Of the total equipment sold in the primary suppliers' market, 40–60% is refurbished and resold to new customers in the secondary market who have relatively limited budgets.

On the other hand, the secondary medical and diagnostic equipment market is driven by highly price-sensitive participants—e.g., manufacturers, secondhand distributors—who prefer buying secondhand equipment at very low scrap value. This implies an appetite for short-term financing with a lower ticket size.

Currently, six major financing options exist for diagnostics equipment, i.e. reagent rental, outright purchase, vendor leasing, leasing, revenue-sharing arrangements, and equity finance. Four of these can be seen as favorable to both diagnostic and financial service providers—equity finance, leasing, joint leasing contract, and revenue sharing arrangements.

[5] The revenue-share model is similar to *murabahah*, an Islamic financing structure in which the seller provides the cost and profit margin of a commodity. This is also referred to as cost-plus financing. It is not an interest-bearing loan but is an acceptable form of credit sale under Islamic law. As with a rent-to-own arrangement, the purchaser does not become the true owner until the loan is fully paid.

1 BACKGROUND

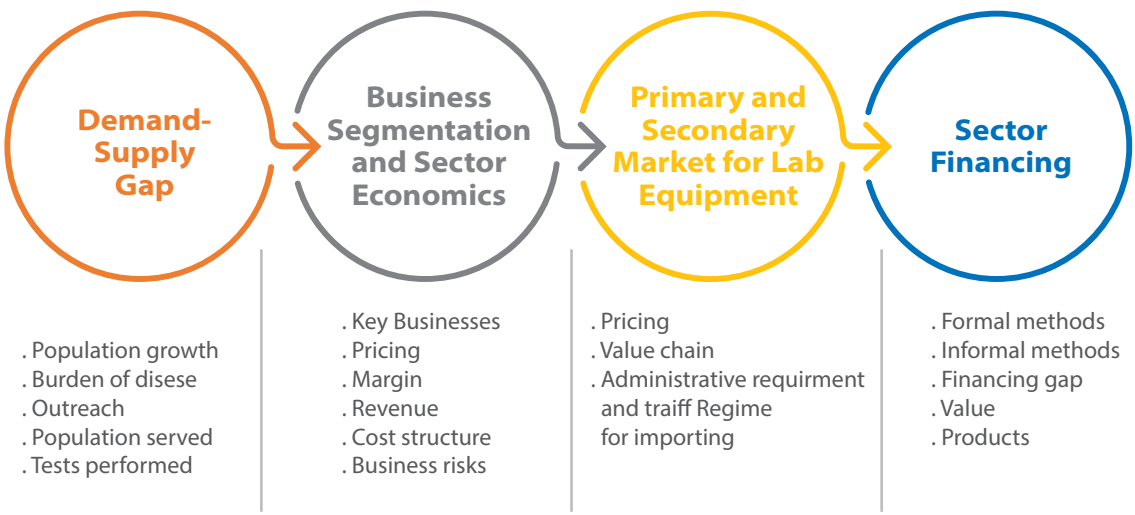
This study focused on assessing the clinical laboratories and medical diagnostics market, as well as the current availability and future need for formal financing models in Pakistan to help address affordability issues. The majority of the domestic medical equipment market is concentrated on imported products. Many foreign manufacturers and suppliers appoint one or more agents/distributors to cover the entire country. With low switching costs, it is comparatively easy to switch agents and distributors in Pakistan without being exposed to legal liability. Major factors that affect buying decisions of medical equipment include price, quality, and after-sales service support.

This report evaluates the dynamics of private facilities for the procurement of medical equipment and devices since public-sector entities do not generally avail external financing. Interviews were conducted across 16 market experts, including laboratory owners, manufacturers, financial service providers, and distributors to gauge the demand and supply dynamics of the private facilities market. The objective of these interviews was to gain insights to conduct an in-depth assessment of the medical and diagnostic equipment market in the following areas:

- The burden of communicable and non-communicable diseases;
- Profiling of clinical laboratories—number, geographic spread, income, ownership and management structures, and business revenue and profitability, etc.;
- Profiling of the primary and secondary market for equipment—types, brands, suppliers, import duties, maintenance costs, repair and replacement, warranty, obsolescence patterns by equipment type, etc.

The demand and supply analysis was complemented by an overview of the provision of, and access to formal financial services (providers, products, terms, etc.) along with an assessment of the role that the formal financial sector could play in enhancing the growth and productivity of this segment to facilitate and enable access to healthcare in Pakistan. Since supplier credit plays a significant role in providing access to credit, the study also included an assessment of this arrangement—providers, terms, challenges, buy-back guarantees, etc. Figure 1 shows the study's process flow.

Figure 1: Process flow of study



The study's overarching goal is to provide financial institutions (FIs) with insight into this business segment, particularly relating to small- and medium-sized medical and diagnostic equipment companies. This can enable FIs to design new financial products or tailor existing ones that are more responsive to demand and more closely aligned with the segment's financing requirements.

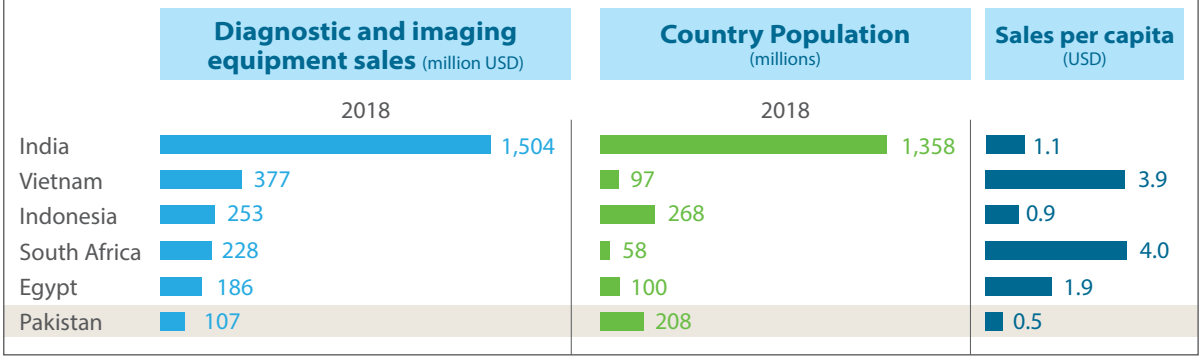
[6] According to the International Finance Corporation (IFC), small enterprises have an annual turnover of USD 100,000–3 million and a paid-up capital of USD 100,000–3 million whereas medium enterprises have an annual turnover of USD 3 million–15 million and a paid-up capital of USD 3 million–15 million.

2 DEMAND AND SUPPLY GAP

2.1 OVERALL MARKET AND TYPES OF PLAYERS

When comparing Pakistan's diagnostic and imaging equipment market to other peer countries globally, it was found that the market is significantly under-penetrated. Sales per capita of diagnostic and imaging equipment in Pakistan is USD 0.5, which is significantly diluted when compared to other developing Asian countries with relatively similar GDP per capita, such as Vietnam and India, whose sales per capita stands at USD 3.9 and USD 1.1, respectively. Figure 2 shows a comparison of Pakistan's market against its peer countries.

Figure 2: Global diagnostic and imaging equipment market—by sales and sales per capita[7]

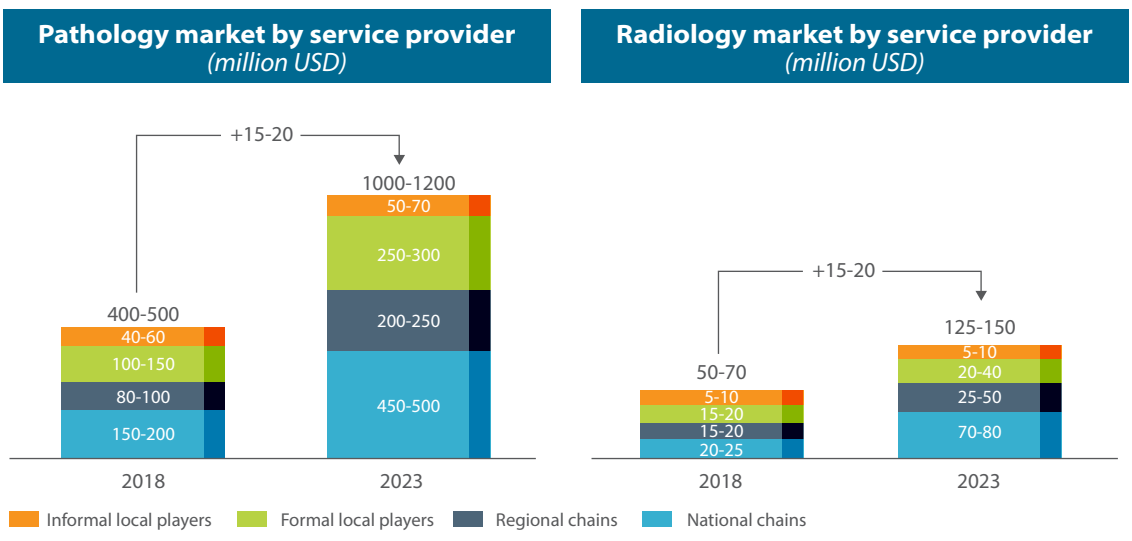


Among private diagnostic service providers, pathology and radiology are the key focus areas of this study. An initial assessment indicated that a significant market of the private facilities segment, amounting to about USD 500 million–600 million in aggregate, exists today. With an expected compounded growth of about 15% in the next five years (2018–2023), the overall segment size is anticipated to reach to USD 1,125 million–1,350 million by 2023,[8] whereby most of this growth is driven by formal local players, regional players, and national players. In particular, formal local players are anticipated to grow by ~2x in the pathology market and up to 20 million in the radiology market by 2023.

The size of regional players, on the other hand, is expected to expand more than 2x in both segments (pathology and radiology) during the same period (Figure 3).

[7] BMI Medical Devices Report and World Bank Data.
[8] Assumptions used are (i) the market is expected to experience ~10% growth in terms of volume; (ii) volume share of structured players will increase; (iii) price growth is expected to stay around ~3–5%. These assumptions are taken from market trends over the last ten years.

Figure 3: Private diagnostic service providers' market for pathology and radiology in 2018 and 2023[9] (million USD)



There are four segments in the private diagnostic service providers market for pathology and radiology, each with their own revenue make-up (Table 2).

Table 2: Private diagnostic service providers' market for pathology and radiology

Segment	2018 avg. revenue per test (USD) for pathology	2018 avg. revenue per test (USD) for radiology
Informal local players	~ 1–2	~ 15–20
Formal local players	~ 4–6	~ 30–40
Regional players	~ 5–8	~ 90–100
National players	~ 8–12	~ 110–120

Within the pathology diagnostic services market, Pakistan's national players makeup about 40% of the value and are expected to continue their dominance in the near future. This is mainly because national players are already beginning to expand their customer base by providing quality services in second- and third-tier cities along with an enhanced footprint in rural areas. On the other hand, regional players and formal local players are catching up as quality service providers with a limited number of players starting to expand to nearby cities in addition to first-tier cities.

[9] Assumptions that the market is expected to experience about 10% volume growth, volume share of structured players will increase, and price growth is expected to stay around 3–5%.

In the radiology diagnostic services market, regional and local players are providing services that are as competitive as national brands. The majority of these players are expanding their service offerings with the inclusion of advanced technology to conduct more tests.

2.2 DEMAND-SIDE OPPORTUNITY FOR DIAGNOSTIC SERVICES MARKET

2.2.1 Approach and assumptions

An analysis of the demand-side opportunity was conducted using disease prevalence from available secondary information to further validate the diagnostic services market's growth potential.

About 55% of the total disease burden was calculated among total disease prevalence cases, which consists of maternal diseases and communicable and non-communicable diseases.[10] The remaining 45% were then projected. The following steps were performed to derive these projections to estimate the total disease prevalent pool:

- The major disease burden in Pakistan was identified and it was assumed that diagnostic tests will be performed for these major diseases;
- Among over 50 types of communicable[11] and non-communicable diseases defined by the WHO, diseases based on the availability of prevalence data for a respective disease were selected. This formed about 55% of the major disease burden;
- Potential tests (X) that are needed to diagnose these diseases were determined that makeup 55% of the major disease burden (see Figure 5);
- For the remaining 45%, it was assumed that if X number of tests are required to diagnose 55% of the burden, then what would be the number of tests required to diagnose the total disease burden in the country?

After the identification of the patient pool, the following assumptions were used to estimate the number of patients who can afford diagnostics tests as well as the number of patients who are diagnosed:

- To estimate the number of patients who can afford diagnostics tests, people receiving antenatal care (ANC) were assumed to possess the willingness to pay extra for healthcare in Pakistan as maternal diseases make up about 20% of disease burden;

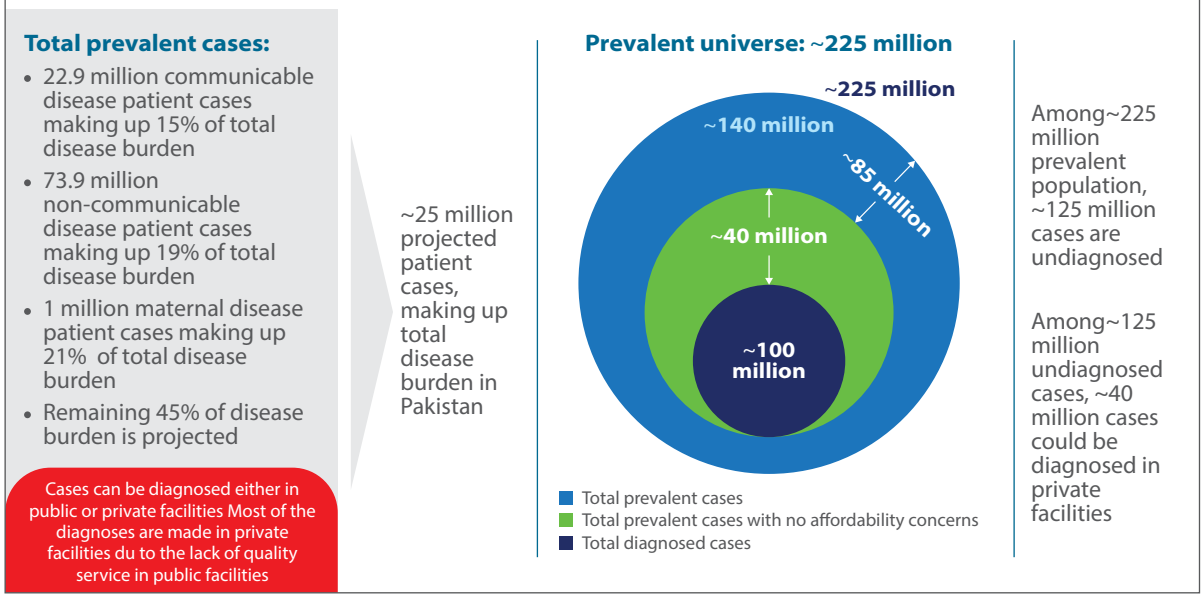
[10] Of the 55% total disease burden in Pakistan covered in our patient pool calculation, (i) 21% are maternal diseases consisting of preterm birth complications, birth asphyxia, and birth trauma neonatal sepsis and infections, (ii) 15% are other communicable diseases consisting of lower respiratory infections, diarrheal diseases, tuberculosis, and hepatitis, (iii) 19% are non-communicable diseases consisting of ischemic heart disease, stroke, chronic obstructive pulmonary disease, kidney diseases, congenital heart anomalies, and cancer.
[11] https://www.who.int/topics/infectious_diseases/en/.

- We used a selection of reference diseases for the diagnosis rate based on publicly available data to estimate the number of patients who are diagnosed.

2.2.2 Findings

Initial analysis showed that overall, the demand for diagnostic tests in Pakistan is 2.25 times the supply—across public and private providers. Furthermore, among the total market of about 225 million disease-prevalent patient cases, findings showed that about 40 million of the cases are not diagnosed even though patients can afford to a diagnostic test. It can be reasonably argued that this population can potentially be diagnosed at private facilities as public ones not only lack quality diagnosis, but lack sufficient infrastructure which limits their capacity to bridge this gap. In addition, another 85 million patient cases are not diagnosed due to affordability challenges (Figure 4).

Figure 4: Total market for diagnostic testing among disease-prevalent patient cases—by diagnosed cases and affordability



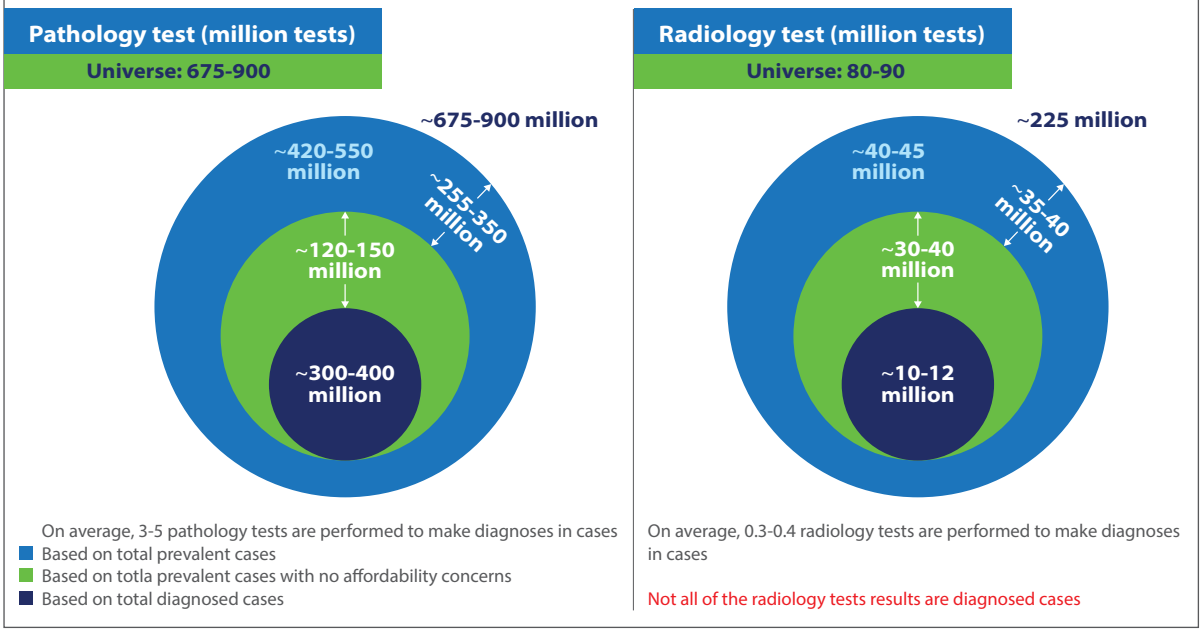
[Note 1] Prevalence is a statistical concept referring to the number of cases of a disease that are present in a particular population at a given time. The diseases can consist of maternal diseases, communicable and non-communicable diseases.

[Note 2] A patient case is defined as an episode of illness. One person can have multiple episodes of illnesses during the course of the year. Each episode could require multiple diagnostic tests.

Estimates show that about 120 million–150 million pathology tests and 30 million–43 million radiology tests could have been performed on the patient pool of approximately 40 million patient cases who are undiagnosed but can afford a diagnostic test (Figure 5). [12]

[12] A patient case is defined as an episode of illness. One person can have multiple episodes of illness during the course of a year. Each episode could require multiple diagnostic tests. We have estimated that on average, 3–5 pathology tests are performed to make a diagnosis in cases and on average, 0.3–0.4 radiology tests are performed to make diagnoses in cases.

Figure 5: Total potential market for diagnostic testing among disease-prevalent patient cases—by test type



[Note 1] Prevalence is a statistical concept referring to the number of cases of a disease that are present in a particular population at a given time

[Note 2] A patient case is defined as an episode of illness. One person can have multiple episodes of illness during the course of a year. Each episode could require multiple diagnostic tests.

In addition, when estimating the potential patient pool across different Pakistani provinces, Punjab and Sindh are projected to have the highest number of patient cases who are undiagnosed but can afford diagnostic tests. This number is estimated to be about 15 million in each of the two provinces.

2.3 DEMAND- AND SUPPLY-BASED SIZING FOR DIAGNOSTIC SERVICES

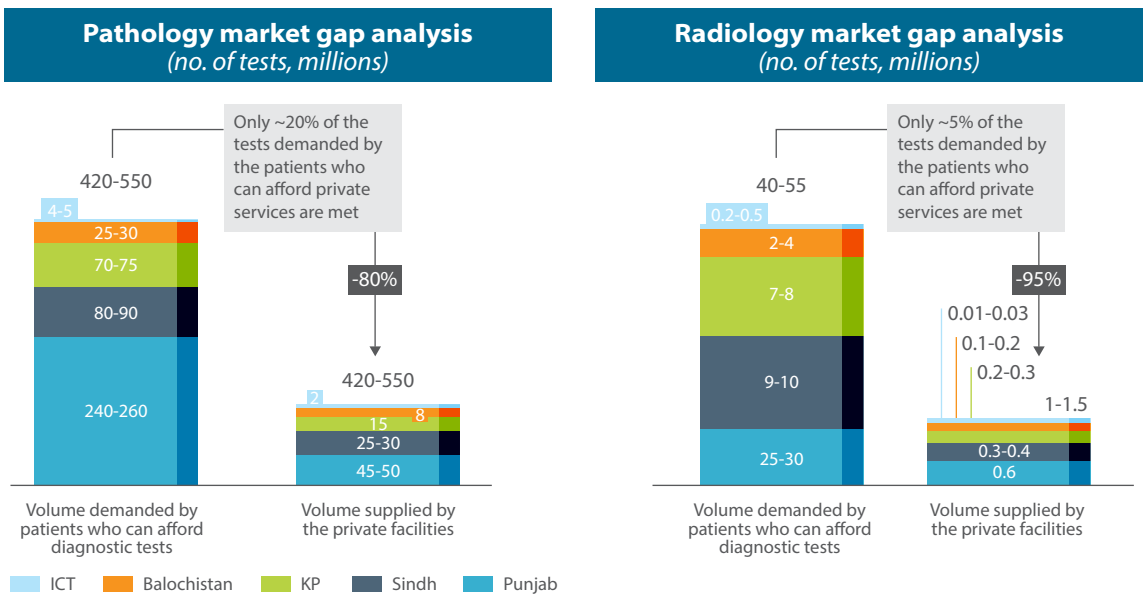
After conducting an estimation of the cases that can be diagnosed, the prevalent gap between demand and supply for diagnostics services was then identified across test and facility type, focusing on private facilities.

[12] A patient case is defined as an episode of illness. One person can have multiple episodes of illness during the course of a year. Each episode could require multiple diagnostic tests. We have estimated that on average, 3–5 pathology tests are performed to make a diagnosis in cases and on average, 0.3–0.4 radiology tests are performed to make diagnoses in cases.

It was found that a major shortage exists, particularly for the radiology segment. Within the pathology test market, there is a 25% unmet demand from current public and private facilities while within the radiology test market, this gap is 85%.

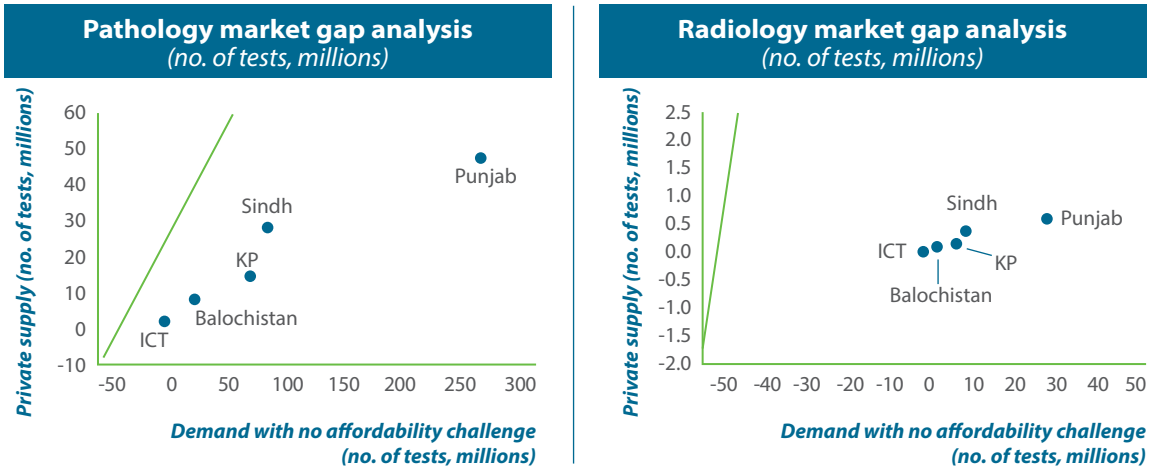
Considering the patient pool that can afford diagnostic services at private facilities, an even greater gap was found between the demand and supply for such services across both test types—radiology and pathology. Within the pathology and radiology test market, there is a respective 80% and 95% of unmet demand for patients who can afford private diagnostic services. It should be noted that the volume of services supplied by private facilities could be larger than the actual number of diagnosed cases (Figure 6). This is because the volume supplied is calculated based on the number of tests performed while the tests performed may or may not result in a diagnosis.

Figure 6: Demand and supply analysis for diagnostic services within private facilities across test types—for patients with no affordability concerns



Within the private diagnostic testing segment, gap analysis showed that all provinces have been underserved. As a first step, service providers can start focusing on Punjab and Sindh as the two provinces potentially have the largest number of tests that can be performed to meet its high unmet demand. These two provinces have the highest number of patient cases who are undiagnosed and yet can afford diagnostic tests (Figure 7).

Figure 7: Gap analysis of private diagnostic services across provinces—by number of tests[13]



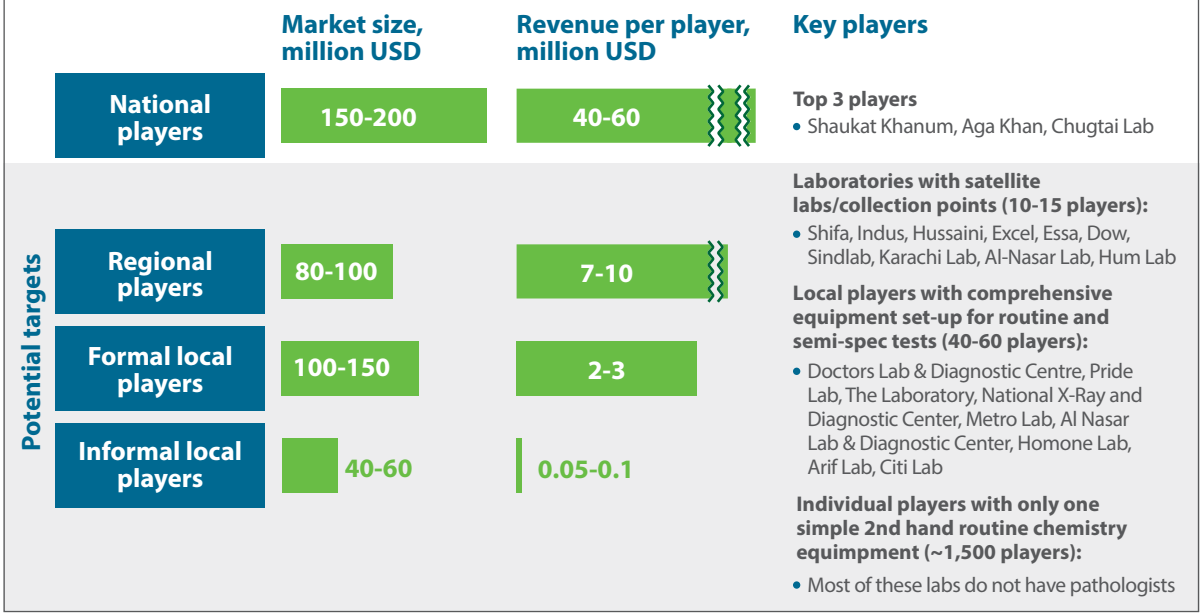
[13] The red line in the figure show the 0:0 coordinates along the demand and supply axis in the private diagnostics market. The bubbles that fall below the red line show that the market has been under-served.

3 BUSINESS SEGMENTATION AND MARKET PLAYERS

3.1 PROFILE OF PATHOLOGY PRIVATE DIAGNOSTIC TEST SERVICE PROVIDERS

Following the profiling of pathology diagnostic test providers in the category of small and medium enterprises,[14] four segments were identified within the private facilities space based on their level of service and geographic reach. These segments were national players, regional players, formal local players, and informal local players. Figure 8 shows their respective profile by market size, revenue, and key players.

Figure 8: Market profile of pathology diagnostic test service providers in private facilities

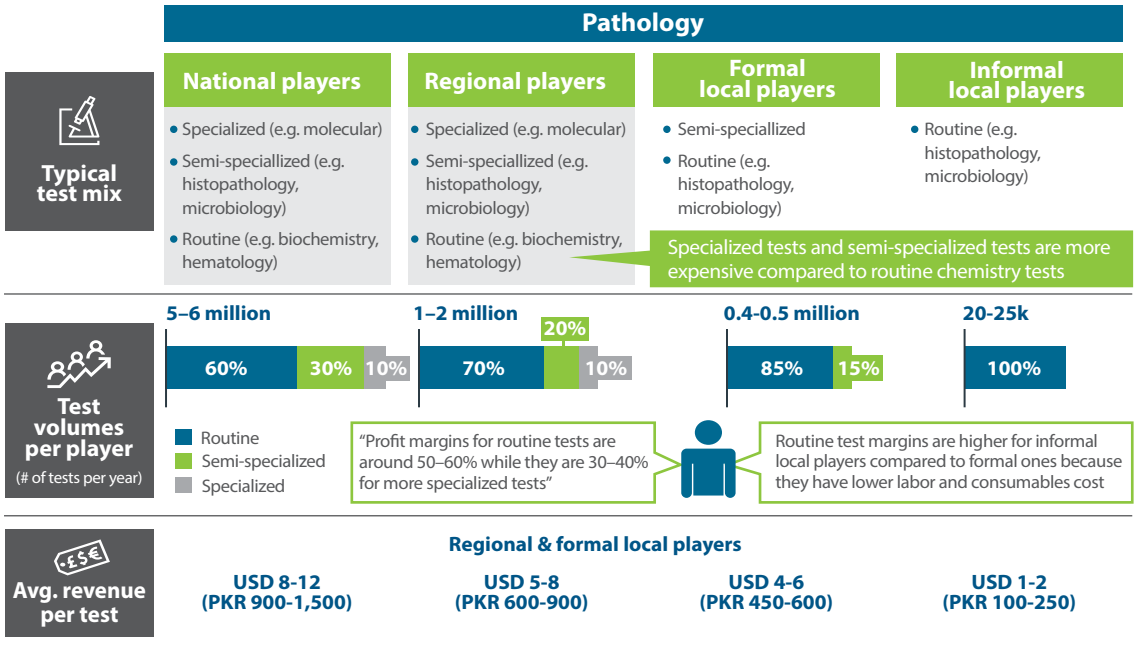


There are some structural differences between each of the four segments such as the number of satellite labs and collection points—national and regional players have an enhanced outreach compared to local players. In addition to the greater size of their facilities, national and regional players tend to have the most recent technology and equipment that can perform more specialized and semi-specialized tests compared to local players.

[14] According to the International Finance Corporation, small enterprises have an annual turnover of USD 100,000–3 million and a paid-up capital of USD 100,000–3 million, whereas medium enterprises have an annual turnover of USD 3 million–15 million and a paid-up capital of USD 3 million–15 million.

In the private facilities space, 90 million—120 million pathology tests are performed annually by the four segments of pathology service providers at different pricing points. Figure 9 summarizes the typical test mix, volume, and average revenue per test.

Figure 9: Typical test mix, volume, and average revenue of pathology test diagnostic service providers in private facilities—by segment

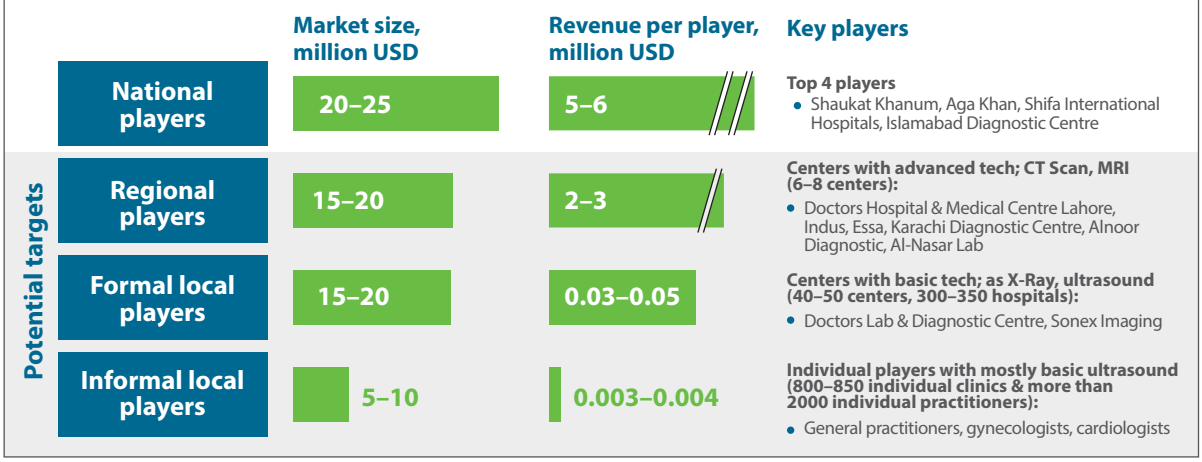


We found that approximately 90% of equipment is bought using reagent rental models among the various purchasing options for pathology diagnostic equipment. In a reagent model, reagents are purchased at an agreed cost per test which varies with test volume, i.e. overall rental costs may decrease with higher test volume per machine. Such a procurement model provides extensive benefits for clinical laboratories trying to cut costs as they allow them to avoid the tremendous capital outlay associated with the purchase of new equipment. There is little need for most players across the four segments to consider other modes of financing, given that the reagent rental model is relatively well-established in the pathology segment in Pakistan.

3.2 PROFILE OF PRIVATE RADIOLOGY DIAGNOSTIC TEST SERVICE PROVIDERS

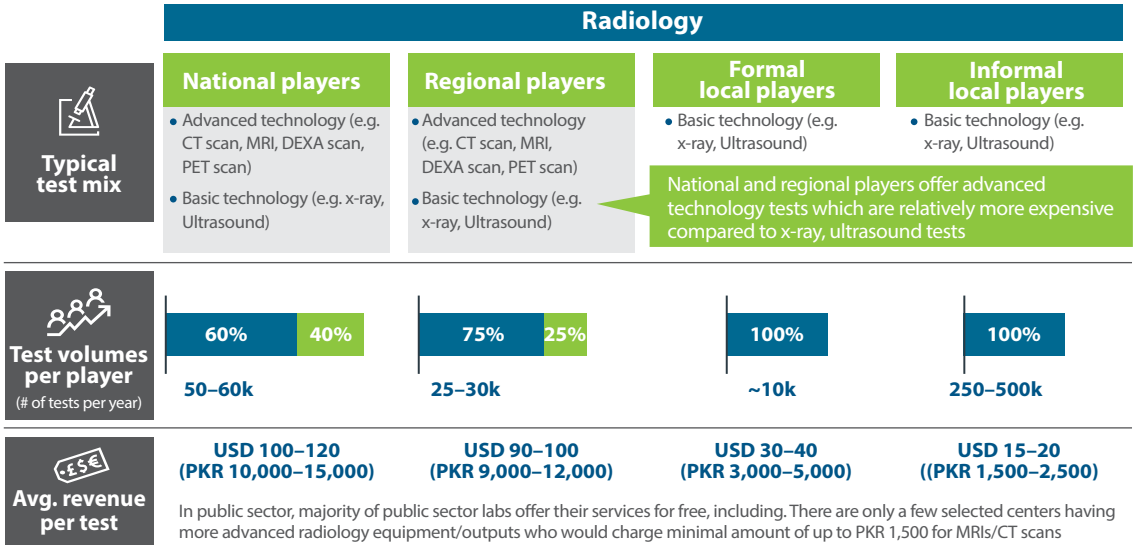
Separate profiling of private radiology diagnostic test providers identified four similar segments based on their level of service, geographic reach, annual revenue, and type of equipment—national players, regional players, formal local players, and informal local players. Figure 10 shows their respective profiles by market size, revenue, and key players.

Figure 10: Market profile for radiology diagnostic test service providers in private facilities



Radiology test services provided by national and regional players are considerably more comprehensive. These players also own more advanced technology than do local players. Reasons include capital and resource constraints and limited outreach to supplier markets. The tests offered in these facilities can potentially include computed tomography (CT) scans, magnetic resonance imaging (MRI) scans, dual-energy X-ray absorptiometry (DEXA) scans, positron emission tomography (PET) scans, mammography, fluoroscopy, X-rays, and ultrasounds. However, such tests are usually performed at a relatively high price. Figure 11 summarizes the test mix, volume, and average revenue per test.

Figure 11: Typical test mix, volume, and average revenue of radiology test diagnostic service providers in private facilities—by player segment



Among the various financing options for radiology diagnostic equipment, we found that the most common modes of financing are private investment, commercial loans or vendor leasing models. Most regional and local players will need to consider various financing options given the high capital expenditures of such equipment.

Given the stronger appetite for financing and better financial credibility among regional and formal local players, these two segments can potentially be targeted by financial institutions.

3.2.1 The regional players' setup in the radiology diagnostic market

Many regional players in the radiology diagnostic market are centrally located in high-density urban areas in order to provide easy access to patients. These regional labs have two tiers of service—catered for institutional clients and other clients—with faster processing time and newer equipment for institutional clients. Institutional clients are usually unwilling to wait in extended queues for tests as they are offered a premium service that is covered through an annual contract. For non-institutional clients, an ordinary regional set-up includes relatively older technology and mostly refurbished[15] equipment with low-to-average priced brands such as Canon and Hitachi. Figure 12 shows the different types of equipment housed in regional labs. Figure 13 shows the typical regional lab structure, location, marketing of services, and customer profile.

Figure 12: Types of regional lab equipment


Ultrasound 1 (new)


X-Ray 1 (second-hand)


1.5 tesla MRI (New)


4-slice CT scan (refurbished)

[15] Refurbished equipment is a product that the manufacturer—or sometimes a third party—has restored to new or like-new condition. This is different from second-hand equipment which are used items.

Figure 13: General profile of regional players in the radiology diagnostic market

Regional player	Organization structure	
Accessible location on main streets Typically building is privately owned 3–5 floors building including two receptions; main reception and corporate reception Building expansion limitations due to central location	• CEO & Owner • Business Development and Sales & Marketing Team • Department heads • Laboratory and diagnostic centre teams	
	Marketing of services	**Customer profile**
	• Circulars and networking by owners Word-of-mouth • Official website • Online marketing through social media (e.g. Facebook, LinkedIn)	• Individual customers walk-in • Referral from physicians based in public or private hospitals • Private insurance carriers • Corporate customers

In terms of growth aspirations, regional players tend to upgrade their existing technologies, such as switching to advance radiology service offerings like CT scans and MRIs, and replacing old basic technology equipment like x-rays and ultrasounds in the short term before seeking to expand to new locations in the region. In the longer term, they partner with investors to become national chains. Figure 14 shows typical financing needs to meet such short- and long-term aspirations.

Figure 14: Regional players' financing needs in the radiology diagnostic market to meet short- and long-term aspirations

	Current		Short term		Long term	
Equipment	**Setup**	**Capital need (USD)**	**Setup**	**Capital need (USD)**	**Setup**	**Capital need (USD)**
CT scan	4 slice–64 slice	~0.4m–1m	32 slice–128 slice	● ~1m–1.5m	1–2 new/ refurbished	● ~2m–3m
MRI	0.5T–1.5T	~1m–2m	1.5T–3T	● ~1.5m–3m	1–2 new/ refurbished	● ~3m–6m
X-ray/ ultrasound	Refurbished	~10k–100k	New	● ~100–200k	4–8 new	● ~0.4m–0.8m
Total including land & building1	1 building in central area	~2m–3.5m	1 building in central area	● ~3m–5.5m	1–2 new buildings in central area	● ~6m–11m

● High need for financing ● Average need for financing ● Low need for financing

3.2.2 *Formal local players' setup in the radiology diagnostic market*

Many local players in the radiology diagnostic market tend to be located in less accessible areas, which limits visibility for walk-in clients. Their labs typically carry refurbished or second-hand equipment of Chinese brands with no scrap value after useful life is reached. However, these local labs are willing to replace this equipment when needed. Despite their less accessible locations,

local labs do have expansion aspirations. These include procuring 1–2 more basic pieces of equipment in the short-term, and relocating to more accessible areas and forming partnerships to extend service offerings using advanced technology medical equipment in the longer term. Figure 15 shows local players' typical financing needs to meet short- and long-term aspirations.

Figure 15: Local players' financing needs in the radiology diagnostic market to meet short- and long-term aspirations

	Current		Short term		Long term	
Equipment	**Setup**	**Capital need (USD)**	**Setup**	**Capital need (USD)**	**Setup**	**Capital need (USD)**
CT scan	-	-	-	-	Refurbished 4 slice–64 slice	● ~0.4m–1m
MRI	-	-	-	-	Refurbished 0.5T–1.5T	● ~1m–2m
X-ray/ ultrasound	Refurbished	~10k–100k	New	● ~100–200k	2–4 new	● ~20k–400k
Total including land & building1	Owned/rented	~5m–8m (in privately owned case	-	-	1–2 new buildings in central area	● ~2m–4m

● High need for financing ● Average need for financing ● Low need for financing

An examination of the radiology diagnostic market across the value chain of players shows a major potential for regional players to become national chains and for formal players to become regional players with focused investment. Figure 16 summarizes the equipment and financial requirements needed for these players to move up the value chain and achieve their business aspirations to extend service offerings in the long run.

Figure 16: Next steps for radiology diagnostic market players

	Informal local players →	Formal local players →	Regional players →	National players
Short term growth aspirations	• Replace old equipment with recent technology	• Procure ~1–2 more basic technology equipment	• Replace old equipment with most recent technology	
Long term growth aspirations	• Become more organized service provider	• Relocate to more visible areas • Extend service offerings	• Partner with investors to extend business in other cities	
Physical requirements	• New basic technology equipment	• More advanced technology equipment such as CT-Scan and MRI	• ~1–2 fully equipped diagnostic centers in other regions	
Financial requirements (USD)	**~50k** **~30k ~100k**	**~3 million** **~2 million ~4 million**	**~8.5 million** **~6 million ~11 million**	

The two target segments with growth potential (formal local players and regional players) are mostly family-run businesses and owned by reputable physicians and healthcare industry leaders. However, it is foreseen that regional players—e.g., centers with advanced technologies like CT scans and MRIs—have an ability to pay back faster than other players (including formal local players) due to a higher test volume and regular customer base secured through corporate contracts. Table 3 shows the revenue and cost breakdown of currently operating players.

Table 3: Revenue and cost breakdown of currently-operating players in the radiology diagnostic market

	Informal local players	Formal local players	Regional players	National players
Test volume (no. of tests) per year	~ 250–500	~ 10k	~ 25k–30k	~ 50k–60k
Avg. test price (USD)	15–20	30–40	90–100	100–120
Operating revenue (USD)	2k–4k	30k–50k	2m–3m	5m–6m
Consumables (% of revenue)	3–5%	3–5%	8–10%	8–10%
Labor cost (% of revenue) *	1–2%	4–5%	10–20%	10–20%
Delivery/distribution cost (% of revenue)	1–2%	3–5%	3–5%	3–5%
Total. Variable cost (USD)	0.1k–0.2k (5–10%)	3k–4k (10–15%)	0.4m–0.6m (20–35%)	1m–1.2m (20–35%)
Rent (% of revenue)	15–20%	15–20%	15–20%	30–35%
Utility/overhead (% of revenue)	~ 5%	~ 5%	~ 10%	30–35%
Maintenance service (% of revenue)	-	~ 5%	~ 5%	
Total fixed cost (USD)	0.4k–0.8k (20–25%)	7.5k–12.5k (25–30%)	0.6m–0.9m (30–35%)	1.5m–1.8m (30–35%)
Operating margin (%)	65–75%	55–65%	35–50%	35–50%

* A registration fee is required for diagnostic centers according to a new regulation passed last year. Registration licenses need to be renewed every year. They account for approximately one percent of total revenue.

4 SECTOR FINANCING

4.1 OVERVIEW OF FINANCING MODELS

Various interviews were conducted to understand the preferred financing models by both diagnostic service providers and financial service providers (Table 4).

Table 4: Service providers' preferred financing models

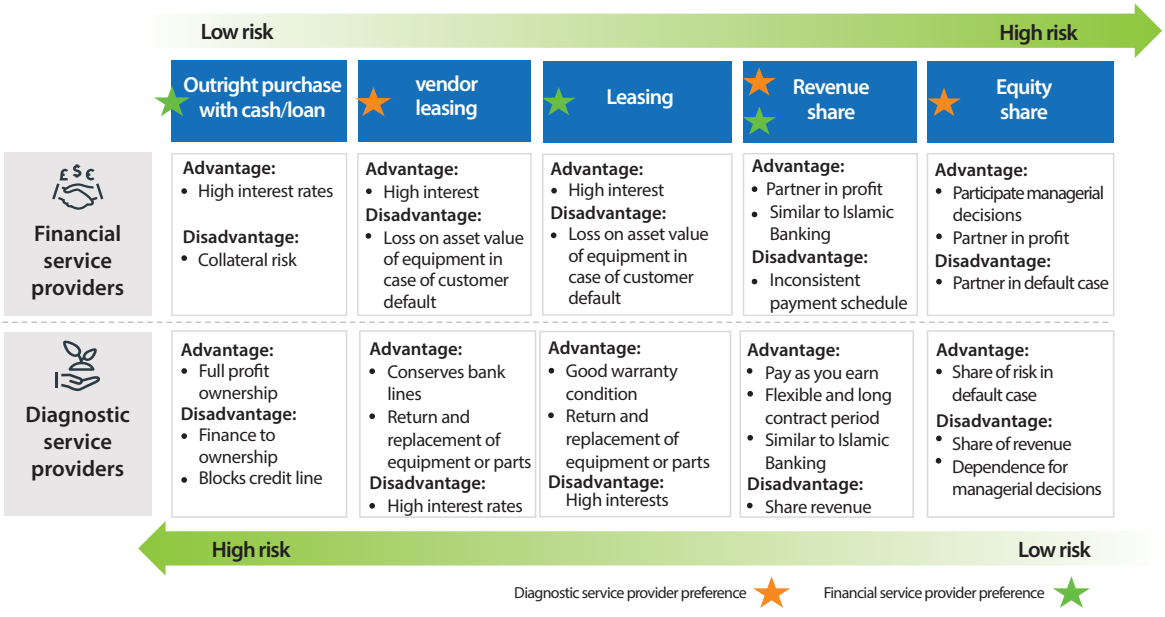
	Description	Preferred by diagnostic service providers	Preferred by financial service providers
Reagent rental	Reagents are purchased at a set cost per test which varies with test volume. This price incorporates a charge for the use of the instrument	✓	
Vendor leasing	Vendor leasing is a model where sellers (equipment distributors or manufacturers) work with financing companies to provide leasing	✓	
Equity share	Equity share is a model where financiers provide financing to purchase equipment in exchange for indefinite partial ownership and revenue sharing of the equipment	✓	
Outright purchase with cash/loan	Outright purchase, whether cash/loan, is the purchase of equipment with direct transfer of ownership from sellers—equipment distributor or the manufacturer—to laboratories		✓
Leasing	Leasing is a model where financiers provide loans to laboratories to purchase equipment. Ownership remains with financiers until the debt is fully serviced		✓
Revenue share	Revenue-share financing is a model where financiers provide financing in exchange for a portion of revenue. Ownership remains with financiers until a certain threshold of revenue is reached	✓	✓

4.1.1 Potential for growth of Islamic financing through the revenue-share model

Based on Table 4, it can be noted that the revenue-share model, which is similar to *murabahah*, [16] is generally a favorable option for both diagnostic and financial service providers. This implies a potential for growth in the Islamic financing market through the revenue-share model. Revenue sharing occurs when a financier provides financing in exchange for a portion of revenue. Ownership remains with the financier until a certain amount of revenue is reached.

Revenue-sharing arrangements are usually used to distribute profits that result from a business alliance. At times, the arrangement is used as an incentive program—a provider may pay partners or associates a percentage-based reward for referring new customers, for example. Figure 17 shows the advantages and disadvantages of the various preferred financing models.

Figure 17: Advantages and disadvantages of various financing models for financial and diagnostic service providers

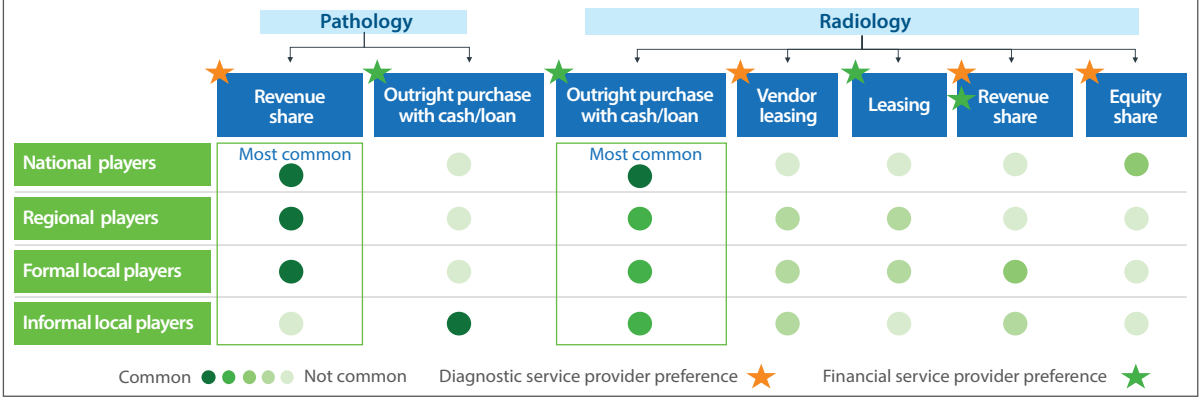


4.1.2 Larger focus on modes of financing options in the radiology equipment market

Pathology equipment is financed mainly through well-established reagent rental models while radiology equipment is usually purchased or leased. Accordingly, this report focuses on the availability of financing options for the radiology equipment market given that there is little need for most players in the pathology equipment market to consider other modes of financing. Figure 18 summarizes the prevalence of financing options across various diagnostic test services.

[16] Murabahah is an Islamic banking practice in which a transaction of goods is sold by one person to another by declaring the actual cost of the goods and adding a profit margin to it. Since the cost of the goods is declared, the dealing is just and a stable income stream is generated.

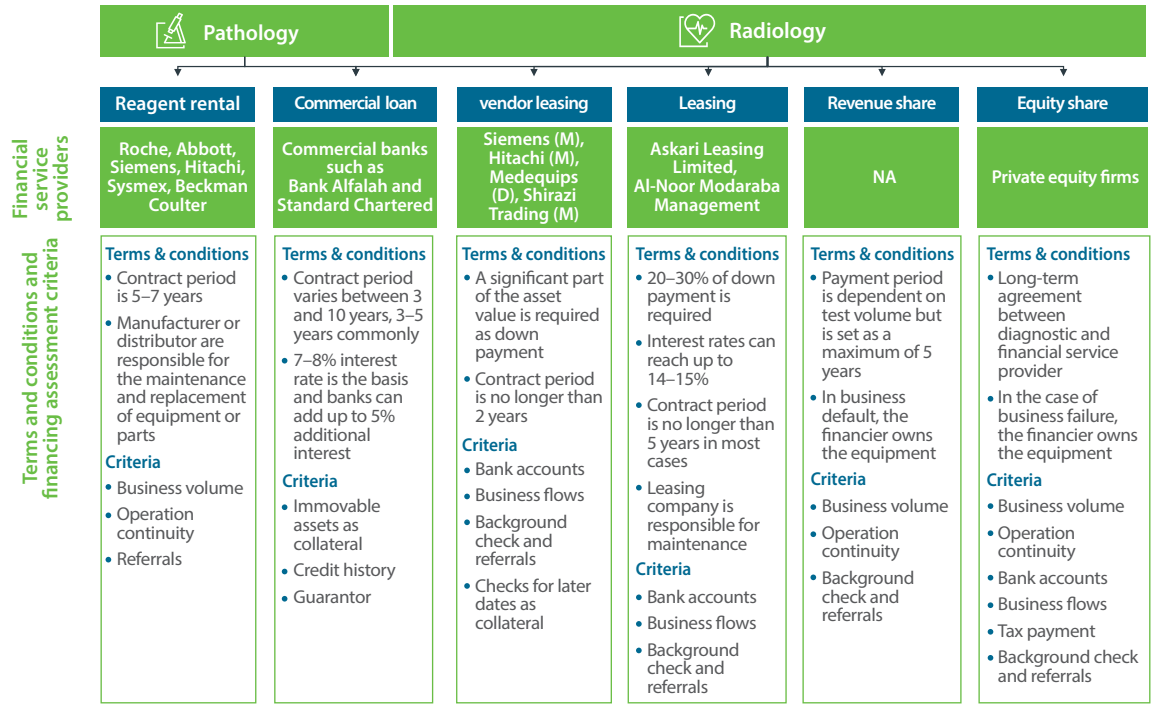
Figure 18: Prevalence of financing models for diagnostic test services



4.2 KEY FINANCIAL SERVICE PROVIDERS AND ASSESSMENT CRITERIA

Interviews with financial service providers show that most of them look at equipment owners' financial credibility and brand equity to mitigate potential risks.[17] Figure 20 lists key financial service providers in Pakistan—for equipment financing—and their assessment criteria.

Figure 19: Key financial service providers and their assessment criteria



[17] This is done through checks of the business history of the customer in the market, cross-checks of customers' business reputation with other business partners, initial screening based on performance in current market dynamics, evaluation of credit history as well as outstanding relations with other financial institutions.

4.3 RECOMMENDATIONS FOR FINANCING OPTIONS ACROSS PLAYERS

Based on the analysis of available financing options and criteria preferred by financial service providers that support equipment financing, this study has compiled some recommendations relating to financing options that are better suited to the radiology equipment market. As mentioned above, the pathology equipment market has not been considered in this report given that the majority of pathology equipment is procured through established reagent rental models.

- Our assessment is that the equity model is the ideal financing option for regional players in the radiology equipment market. Leasing and revenue-sharing arrangements can also be considered for formal local players.

- Preference for the equity model in the case of regional players is based on the rationale that they provide quality diagnostic services, execute significant test volumes, and have sufficient business expansion aspirations along with credible centers owned by reputable businesspersons and physicians.

- Formal local players in this segment are also categorized as credible centers, have constant revenue streams, and receive relatively high demand from customers. While considering the profile of formal local players, factors such as their capability to provide quality basic diagnostic services, aspirations to procure advanced technology equipment in the short term, and reputable ownership profiles will strengthen their position to be considered for financing via options like leasing, equity share, or revenue sharing. From a risk perspective, a formal local player would prefer the revenue-sharing model over leasing because the financial partner will not suffer from losses on the asset value of the equipment in case of customer default. However, a case can be made to explore financing through leasing companies due to a more flexible long-contract period and less stringent procedures in terms of business history checks and financial evaluation and assessment of credit history compared to those conducted by banks, despite the disadvantages of a higher associated financial cost, i.e. interest rates. Given the high customer demand among formal local players and constant revenue stream, it is still possible for them to efficiently manage and cover the financial charges.

- Leasing options should be considered primarily due to (i) less stringent assessment criteria (ii) more flexible documentation and (iii) same contractual terms as commercial bank loans—albeit with higher interest rates. Table 5 shows the key evaluation criteria in choosing leasing companies as a financing option versus commercial bank loans.

Table 5: Commercial bank and leasing company financing evaluation criteria

	Banks (commercial loan providers)	Leasing companies (Lease providers)
Business	• Identification of customers' business history in the market • Cross-check of customers' business reputation with other business partners	• Identification of customers by marketing team • Initial screening based on performance in current market situation • Cross-check of customers' business reputation with other business partners
Financials	• Evaluation of - Credit history - Outstanding relations with other financial institutions • Immovable asset requirement	• Evaluation of - Last 3 years' financial statements - Secondary banking documents - Outstanding relations with other financial institutions • Provision of assistance to customers lacking financial documentation
Regulatory	• Extensive documentation required for the allowance of credit in any amount • Tax certificate and registration	• Documentation required for credit lines exceeding PKR 2 million • Tax certificate and registration

Alternatively, a joint contract provided by vendors and leasing companies to labs and clinics can be considered a new financing option. A joint contract model is a contractual agreement between leasing companies and vendors where both parties typically share both profits and losses. Some key merits of this partnership model are (i) easier financial access to medical diagnostic service providers through their vendors, (ii) more accurate assessment of financial footprints due to lack of information asymmetry, (iii) opportunities for leasing companies to enhance their outreach through a targeted approach. On the other hand, it can be argued that vendors face the possibility of losing established customer relationships due to the higher interest costs associated with this model, while leasing companies may prefer direct penetration of customers in the market rather than involving an intermediary.

One example of a joint contract model between vendors and leasing companies is the ultrasound financing case in Pakistan.

Ultrasound financing case: Typically, under this arrangement, prominent distributors with dominant market share partner with a bank to provide leasing products for ultrasound machines. A well-known equipment distributor with a dominant market share partnered with a bank to provide leasing products for ultrasound financing. However, in this case, the contract was highly stalemated in terms of protection of vendors' rights. This is because, today, there is no legal route or government guarantee for investment protection in Pakistan, which can make a partnership questionable in terms of which party takes responsibility in the event of a loss. As a result, there were strict articles reflected in this contract—the vendor was fully responsible in loss while the leasing product provider was a partner in profit. While most vendors are willing to try these partnerships with leasing companies, equal protection of rights for both parties in a business default case should be evaluated diligently. In the case of a partnership between vendors and leasing companies, the benefits for vendors would be a more accurate financial assessment of diagnostic service providers and a greater offtake of their product portfolio, while leasing companies can have better outreach to more customers easily and enjoy easier access to secondary markets through vendors.

4.4 FINANCIAL MODEL OF ASSESSING RETURN ON INVESTMENT FOR DIFFERENT TYPES OF ADVANCED RADIOLOGY EQUIPMENT

The following are key findings reached through an equipment financial model which is built to understand investment return for financing different types of advanced radiology equipment—specifically MRI and CT scan machines which make up the largest market segment:

- The internal rate of return and net present value—which determine the profitability of a potential investment—are positively correlated with the size of the facility;
- New equipment can be considered a good investment option for national players, but the return is higher for refurbished equipment;
- Investing in refurbished equipment can be prioritized over new equipment in the case of working with regional and formal local players;
- Working with informal local players is not recommended as their payback period is relatively higher—more than five years)

Two of the most commonly used machines MRI (0.5T) and CT Scan (16 Slice) had been selected to assess their projected cashflows across four different segments of players in the diagnostics market. Table 5 summaries the projected cashflows position of these two machines.

Table 5: Projected investment return of MRI (0.5T) and CT Scan (16 Slice) machines across different player segments

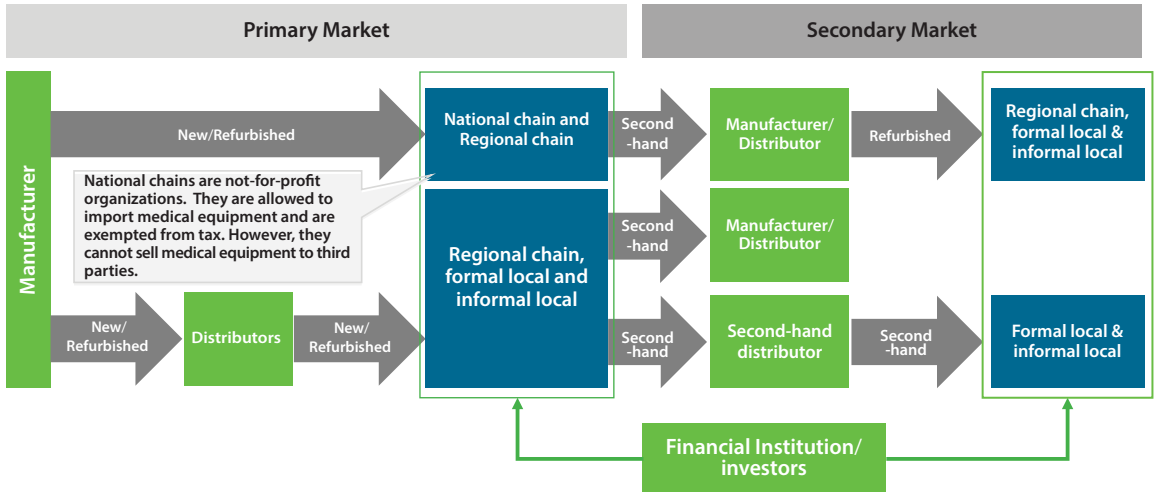
Segment	Type of Machine	Machine	Year 1	Year 2	Year 3	Year 4	Year 5	Payback period (years)
National Player	New	MRI (0.5T)	$160,061	$207,696	$261,108	$283,675	$727,720	4
		CT Scan (16 Slice)	$128,327	$164,859	$205,775	$223,611	$592,615	4
	Refurbished	MRI (0.5T)	$154,726	$201,393	$253,710	$275,039	$472,686	2
		CT Scan (16 Slice)	$123,094	$158,657	$198,478	$215,077	$337,682	2
Regional Player	New	MRI (0.5T)	$82,676	$110,041	$150,928	$175,118	$621,094	Minimum of 5 years
		CT Scan (16 Slice)	$80,401	$104,191	$140,757	$162,754	$536,356	
	Refurbished	MRI (0.5T)	$77,342	$103,737	$143,530	$166,483	$366,060	4
		CT Scan (16 Slice)	$75,168	$97,989	$133,460	$154,220	$281,424	3
Formal Local Players	New	MRI (0.5T)	$50,448	$79,657	$108,016	$132,299	$578,444	Minimum of 5 years
		CT Scan (16 Slice)	$43,641	$67,283	$88,743	$108,659	$480,097	
	Refurbished	MRI (0.5T)	$45,114	$73,354	$100,618	$123,664	$323,410	4
		CT Scan (16 Slice)	$38,408	$61,081	$81,446	$100,125	$225,165	3
Informal Local Players	New	MRI (0.5T)	$5,329	$17,890	$33,465	$38,519	$471,817	More than 5 years
		CT Scan (16 Slice)	$6,881	$17,646	$30,939	$34,279	$395,710	
	Refurbished	MRI (0.5T)	$(5)	$11,587	$26,067	$29,883	$216,784	
		CT Scan (16 Slice)	$1,648	$11,444	$23,642	$25,745	$140,777	

**Note : Maintenance contract is assumed to be standard warranty : service only contract, for the aforementioned scenarios*

5 PRIMARY AND SECONDARY MARKETS FOR MEDICAL DIAGNOSTIC EQUIPMENT

There are two key markets across the medical diagnostic equipment value chain in Pakistan, the primary market and secondary market, each with different market players and customer profiles represented (Figure 20).

Figure 20: Diagnostic equipment value chain



The primary market is well-organized and consists of leading and well-known multinational players who supply new or refurbished equipment. Among multinational players for pathology equipment, three major manufacturers and distributors supply more than half the pathology equipment to labs in Pakistan—Roche, Abbott, and Siemens. For the remaining pathology equipment market, there are approximately 2,000 individual distributors that sell more than 70 brands. Japanese, European and US brands are distributed by relatively more organized players, e.g., Sysmex is distributed by S. Ejazuddin & Co.

In the radiology market, there are five major players that are either present principally or through distributors. They are Canon, Hitachi, Siemens, GE, and Philips. It was also found that of the total

equipment sold in the primary suppliers' market, 40–60% is refurbished and resold to new customers in the secondary market, who have relatively limited budgets.

The secondary market is driven by a vast number of individual players who target second-hand equipment at very low scrap value. Supplier margins are higher in the secondary market and can go up to 30–40%. After useful life is reached, the equipment is either sold to another player in the market or dismantled into separate pieces. There are three types of service contracts provided for new or refurbished equipment—comprehensive, service only, or a one-year provision of maintenance and repair services.[18] However, there is no after-sales service for second-hand equipment—i.e. no warranty and no maintenance and repair services.

In terms of decision-making priorities across different players, it was found that leading national and regional chains prefer better technology and quality products and are less sensitive to prices. After-sales service is of high-to-medium priority for these players as training and refreshment courses are considered important for managing advanced technologies and parts replacement. On the other hand, individual players are highly price-sensitive, which can cause these players to deprioritize quality to maintain low prices. After-sales service is of medium-to-low priority for these players and is not usually considered a key requirement.

[18] This is done through checks of the business history of the customer in the market, cross-checks of customers' business reputation with other business partners, initial screening based on performance in current market dynamics, evaluation of credit history as well as outstanding relations with other financial institutions.

6 RECOMMENDATIONS

A major gap exists in the provision of diagnostic services within the private sector in Pakistan—about 80% and 95% of unmet demand for pathology and radiology services, respectively. There are operators in this domain who could meet this demand if funded appropriately.

Pathology equipment is financed through a well-established reagent rental model. Thus, there is little need for most pathology equipment players to consider other modes of financing. On the other hand, in the radiology equipment market, there is a strong need for financing among regional and local players with good business potential in order to expand their service offerings and achieve growth aspirations.

In terms of capital requirements, regional players generally tend to upgrade their existing technologies and expand to new locations which requires USD 6 million–11 million worth of investment. Formal local players look to replace old equipment and procure more advanced technologies requires up to USD 1 million in investment. Given that regional and formal local players are owned by reputable family businesses and medical professionals, they have good creditworthiness and can be good investment partners. The investment profile of regional players is further enhanced by their payback metric which is faster compared to other players (including formal local players), thus making these players a preferred choice for potential equity investment. Faster recovery of initial investment is mainly due to a higher test volume and an established customer base of corporate clients.

In terms of financing options, revenue-sharing arrangements and equity investments are favorable options for both diagnostic and financial service providers due to the (i) ability to partner in profit, (ii) similarity to Islamic banking practices, i.e. murabahah (in the case of the revenue-share models), (iii) flexible and long contract periods (in the case of revenue-share models) and (iv) risk-sharing in default scenarios (in the case of equity-share models). Alternatively, a joint contract provided by vendors and leasing companies to labs and clinics can be considered a new financing option given advantages such as (i) easier financial access to diagnostic service providers, (ii) more accurate financial assessment due to the lack of information asymmetry and (iii) opportunities for leasing companies to enhance their outreach through a targeted approach.

These financing insights would ideally allow financial institutions (mainly leasing companies) to shape, design, and accelerate the introduction of new financial products or tailor existing product portfolios in such a way that it becomes more responsive to market needs, particularly to the radiology diagnostic market which has a higher estimated demand-supply gap.

Authors:

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Tel: (051) 8449761 | Email: info@karandaaz.com.pk

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