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INTEGRATION OF CATTLE IN OIL-PALM PLANTATIONS (SISKA)

Is it Commercially Viable?

IACCB

Indonesia-Australia Commercial Cattle Breeding Program

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01 Introduction

The practice of integrating cattle and oil palms, known as SISKA, has been occurring in Malaysia for at least 30 years but has not been widely adopted by the commercial plantation sector in Indonesia. The low adoption rate is due to multiple factors including the previously high financial returns generated by oil palm on its own and the perceived risk of elevated *Ganoderma* infection by cattle. Four major factors have made it important to reconsider cattle-oil palm integration. These are:

1. The declining price of crude palm oil and associated decline in plantation profitability,
2. The Government of Indonesia's focus on increasing the national cattle herd to meet food security goals,
3. Recent research proving the financial viability of the cattle component in addition to positively impacting the oil palm component, and
4. Both research and experience have found no link between elevated *Ganoderma* infection and cattle grazing in commercial SISKA systems.

Commercial SISKA¹ is promising because it is able to generate an attractive return on investment, becomes cash-flow positive in Year 3 or 4 after start-up² and delivers benefits to the plantation through reduced weed control and fertiliser costs. Experienced SISKA plantation managers also report increases in fresh fruit bunch (FFB) yields of approximately 4-5% after several years of grazing³. Cattle production is a complex business however, and high-quality planning, implementation and management are essential to success.



This paper provides an overview of the financial returns that have been/can be achieved from commercial SISKA enterprises. The analysis and projections have been generated by a spreadsheet-based cattle enterprise model developed by the Indonesia-Australia Commercial Cattle Breeding Program (IACCB), called CALFIN (Cow-calf Operations Financial Modelling). The analysis uses data and financial projections from one of IACCB's key partner companies based in South Kalimantan. We also examine the financial projections for three options to scale up the herd size of a commercial enterprise⁴.

1 It is important to differentiate between smallholder SISKA, which involves relatively random grazing of cattle under palms in low management systems and commercial SISKA, which is highly planned and management intensive. For more information read: "Commercial Cattle Breeding in Integrated Cattle - Oil Palm Systems: Findings and Lessons from the Indonesia-Australia Commercial Cattle Breeding Project" on www.iaccbp.org or <https://www.redmeatcattlepartnership.org/>

2 "Start-up" refers to the period from planning through to reaching stability of production – including reaching the target herd size.

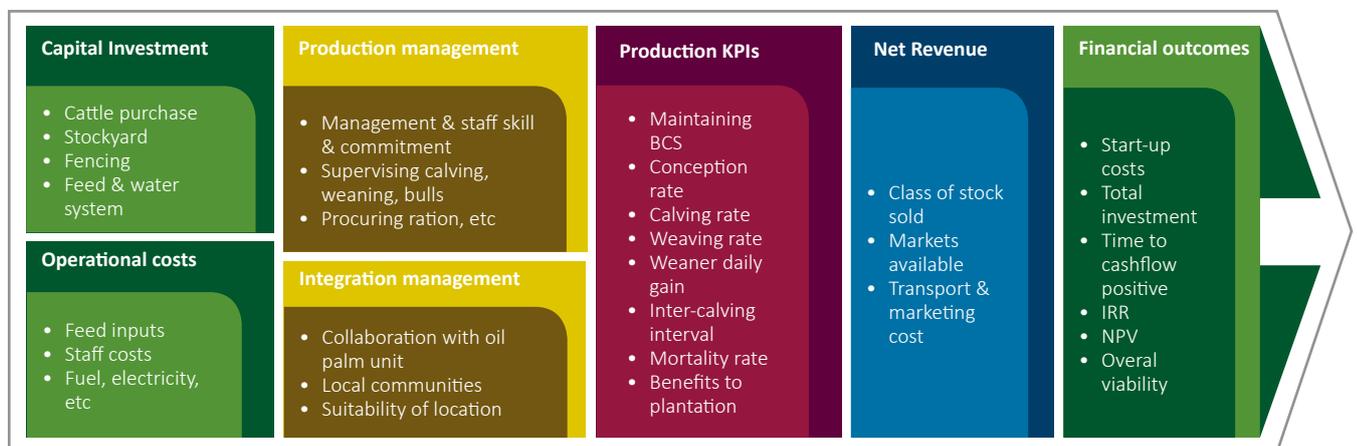
3 Changes in FFB yields are difficult to prove in scientific trials due to the difficulty of controlling related factors such as soil type, aspect, age and genetics of palms, fertiliser and weed control history, etc

4 Financial projections are based on earnings before interest, tax, depreciation and amortisation

02 Factors Influencing Commercial Viability

In simple terms, commercial viability is the outcome of production and sales achievements less investment and operational costs. These outcomes are summarised using metrics such as the internal rate of return (IRR) and the net present value of the investment (NPV). Figure 1 provides a schematic overview of the factors that impact viability, all of which are interrelated. Production KPIs and sales revenue drives the revenue base. Quality and integration factors directly impact production outcomes but are difficult to quantify and therefore not directly included in CALFIN.

Figure 1. Factors impacting the commercial viability of a SISKI enterprise. CALFIN is driven by data for green boxes and assumptions for revenue (blue box). Quality and integration factors are not directly considered but strongly impact KPIs and financial outcomes achieved



Capital Investment

Cattle purchases are the largest investment and have a major impact on production outcomes. Bali cattle are not appropriate for commercial supply chains and *Bos taurus* breeds are poorly adapted to the hot, humid environments of Indonesia. Therefore Brahman-cross (BX) cattle are generally preferred. Small numbers of Ongole cattle may be able to be purchased within Indonesia, but generally start-up herds are purchased from Australia. Timing purchases to coincide with periods of low cattle prices in Australia should be considered as prices tend to fluctuate dramatically with seasonal conditions. BX breeders can sometimes be purchased from Indonesian feedlot companies.

As an example, one of IACCB's partners commenced cattle operations in October 2016 with an initial investment of 300 productive heifers and 20 bulls grazing 1,600 ha of oil palm plantation. Investment in supporting infrastructure was required for cattle yards, pens, cattle crush, electric fence, digital scales, small trucks and other equipment/supplies. Of the total initial investment of IDR⁵ 7.1 billion, 89% was used for cattle purchases. Over the first 3 years of operation, the company invested an additional IDR 8.4 billion for a complete investment of IDR15.5 billion.

5 1 AUD = approx. IDR 10,000.



Start-up costs need to be minimised without negatively impacting production targets. Common errors include building a large and expensive stockyard at the outset. The stockyard is a major investment and can be designed as a small facility initially that has potential to be expanded as the need arises. It is also unwise to purchase cattle of inferior or unknown productivity and temperament.

Operational Costs

Cattle production in SISKA is based on grazing the natural herbage under the palms - a low-cost feed base. Additional concentrate supplements are still required to maintain ideal breeder weight and to achieve optimum average daily gains (ADG) of their calves. Supplements usually include feed by-products available on the plantation, such as palm kernel cake (PKC) and mill sludge (solids). These should be fed at rates that maintain the desired body condition⁶ of cows at the lowest possible cost.

Over the past 2 years (2018-2019), IACCB's key partners have achieved an average feed cost⁷ of IDR 4,800/ head/day for cows and calves, and IDR 4,200/head/day for growers (Table 1). These costs include labour involved in feeding the daily supplements.

Labour costs are significantly impacted by herd size, with efficiencies of scale being achieved as the herd grows to 600 breeders. Efficiency gains tend to flatten out above this herd size. As a rule, one stockman should be able to manage between 100 and 200 breeders. Additional staff may be needed for feeding and other operations, depending on the efficiency of systems used.

Among IACCB's partners, the average operational cost⁸ is approximately IDR 5,450/head/day. IACCB's experience is that the combined feed and operational costs need to be less than IDR 10,000/head/day to achieve a profitable outcome from SISKA.

6 Brahman-cross cattle should be maintained at a body condition score of 3 or more to ensure reproductive efficiency. This equates with a moderate level of fat cover across the hind quarters.

7 Feed costs include concentrate supplements for grazing cattle or cattle kept in pens for special handling, and logistics and water.

8 Operational costs include workers, cattle yard/pens maintenance, utilities, vehicle operation costs and other overhead costs.

03

Production and Integration Management

Profitability outcomes are largely driven by production and integration management factors. Skilled cattle managers and stockmen are required but can be difficult to recruit and retain in the remote locations typical of oil palm plantations. Staff must understand cattle and be committed to attending to their needs on a full-time basis. For example, all the work involved in producing a calf can be easily lost if screw-fly infection is not immediately treated as it will often result in the calf dying.

Integration

The successful integration of the cattle component in a Siska operation is closely related to the efforts of the management team, plantation and livestock staff, and company owners to ensure success. Cattle breeding has a different work culture from the normal oil palm plantation business. It is a fulltime activity – 24 hours a day, 7 days a week. Plantation workers will need time and support to adapt to the presence of cattle in their plantation. Initial concerns that cattle will interfere with plantation activities and performance must be constructively and sympathetically addressed. The Siska model applies a Rotational Grazing⁹ system. The grazing schedule must be adjusted to match plantation activities such as spraying, pruning, fertilizing, harvesting and other activities so they do not interfere with each other, but are mutually beneficial. For example, pruned fronds provide good cattle feed if pruning is conducted immediately prior to cattle entering the block.

IACCB, strongly recommends that companies apply a “host and guest”¹⁰ principle to maintain the synergy and internal collaboration between plantation workers and stockmen. Under this principle, the plantation represents the “host” and cattle represents the “guest”. A good host is able to serve the guests and good guests do not disturb the host.

Community integration

Cattle graze across extensive plantation areas. In some locations they will interact with local communities and possibly local cattle herds. The company must therefore establish coordination and cooperation with the local communities to ensure the safety and security of both cattle and communities.

Geographic constraints

Plantation location and geographic conditions will impact the initial investment and operational costs and potential profitability. Supplementary feeds are essential and can be based on plantation by-products, such as PKC and solids. Other concentrate feeds, such as soybean and copra meal, may not be locally available. A prolonged dry season can cause forage shortages, while a prolonged rainy season has the potential to increase calf mortality and paralyze business operations if flooding limits access. Remote locations can also constrain the ability to recruit and retain skilled human resources to manage the cattle.

⁹ Intensive Rotational Grazing or Cell Grazing is a grazing system where cattle are moved from one block/cell to another block/cell in a certain period of time – commonly 1 to 2 days depending on available fodder in the blocks/cells. Download the Commercial Cattle Breeding Business in Indonesia Manual from IACCB’s website: www.iaccbp.org or <https://www.redmeatcattlepartnership.org/>

¹⁰ The host-guest comparison was introduced by PT Buana Karya Bhakti Siska Ranch Manager.

04 Production KPIs

Cattle production KPIs

Production KPIs and quality factors are inherently linked. Providing appropriate supplementary rations assists in maintenance of the body condition score (BCS) of breeders. Correct BCS supports high conception and calving rates. Effective weaning leads to high weaner ADGs and so on.

IACCB has developed benchmarks for each of the crucial KPIs. These benchmarks will take two to three years to be achieved but are possible based on experience among IACCB's partners. For example, our partners were able to achieve weaning rates of approximately 65% and weaners achieved ADGs of approximately 0.45 kg. These are good results for a new breeding operation. Ideally weaning rates should improve to approximately 70% or higher with good management and experience.

Based on the outcomes achieved by IACCB's partners, the total cost of producing a weaned calf was approximately IDR 5.7 million. The total cost of producing feeder cattle averaging 320 kg live weight was approximately IDR 10.7 million. A liveweight of 320 kg can be achieved within 16 months after weaning (assuming calves are weaned at 4 months old at 100 kg). It is therefore possible to produce feeder cattle at **IDR 33,600** per kg liveweight. The average cost of a feeder steer imported from Australia was IDR 40,000 to IDR 45,000 per kg in 2019, and up to IDR50,000 per kg in 2020. Even using the lower cost range for Australian cattle (IDR 40,000/kg), the feeder production **cost is 16% lower** than for imported cattle.

Table 1. Production cost from IACCB partners averaged over a 3-year period

| | |
|--|-----------------------|
| Cows' Costs | |
| Feed cost (/hd/day)- Cows | IDR 4,800 |
| Operational costs (/hd/day) | IDR 5,450 |
| Sub-total Daily Cost/hd | IDR 10,250 |
| Calving Rate | 69.4% |
| Daily Costs/hd ind. non-productive Cows | IDR 14,780 |
| Calves Mortality | 5.6% |
| Total Daily Costs /hd-Cows* | IDR 15,650 |
| Weaner Cost (100kg) | IDR 5,712,250 |
| <i>*incl. the costs calculation o non-productive cows and calves mortality</i> | |
| Calf weight at weaning (kgs/hd) | 100 kg |
| Grower weight gain (kgs/hd/day) | 0.45 kg |
| Target weight at sale | 320 kg |
| Months requires (Weaning to sale) | 16 mnth |
| Growers' Costs | |
| Feed cost (/hd/day)- Growers | IDR 4,200 |
| Operational (/hd/day)- Cows + Growers | IDR 5,450 |
| Sub-total costs to weaning (/hd/day) | IDR 9,650 |
| Grower mortalities | 6.6% |
| Total Daily Costs (/hd/day)- Growers | IDR 10,330 |
| Rearing Costs from Grower to Feeder /hd (320kg) | IDR 5,050,200 |
| <i>**incl. the costs' calculation of grower motality</i> | |
| Total Feeder Costs /hd (320 kg) | IDR 10,762,450 |

Benefits to the oil palm component

The oil palm component of the combined enterprise should also benefit directly from cattle integration. Based on IACCB's experience and the results of research conducted by Agency for the Assessment and Application of Technology (BPPT), weed control savings of between IDR 70,000 and IDR 170,000 per ha per year (depending on location) can be achieved in the plantation blocks grazed by cattle. Further, no additional organic fertilizers need to be applied in the grazed areas. This provides a cost-saving of approximately IDR 250,000 per ha per year. These savings are able to be realised after the third year of grazing. When these benefits are included in the financial calculations, the IRR values increase by 2-3%¹¹. If increases in FFB yields are achieved, as has been reported by IACCB partners (approximately 4-5% increase), then substantial increases in IRR are possible.

11 Only calculate initial allocated plantation areas, exclude expanded areas

05 Net Revenue

Cost of Gain

All cattle breeding operations should be considering what can be done to achieve the highest rate of daily liveweight gain for calves, weaners and growers at the lowest cost. Feeding very high-quality rations to these cattle may produce very high ADGs but may not provide the greatest profitability due to the cost of the ration. Conversely, feeding very low-cost, low-quality rations will result in very low ADGs, long durations to reach sale weights and low overall profitability. For each operation there will be an optimum supplementary ration depending on the quality of the plantation pastures and the cost and availability of supplementary feeds. Feeds produced on the plantation, such as PKC and sludge are likely to give low cost liveweight gains. Small amounts of very high protein rations, such as soybean meal can boost ADGs at relatively low cost, as long as there are good quality roughages provided as the base feed. The services of an experienced ruminant nutritionist should be engaged to achieve the right ration to deliver the desired ADGs and the lowest cost.

Marketing and sales

Not surprisingly, sale price will have a large impact on financial outcomes. Sale price is impacted by market factors, such as location, sales methods and buyer preferences, as well as the quality of the cattle being sold. In remote locations cattle are generally sold by appearance on a per head basis (*jogrogan*), rather than on a weight basis. There is generally a preference for small-framed cattle of around 350 kg mature weight, rather than large-framed cattle of 500 kg liveweight. Not all locations have a high demand for beef.

It may be easier to sell small numbers of cattle each week rather than selling larger number less frequently. This is the approach being taken by IACCB's partners. However, if cattle are unable to be sold locally it would be necessary to transport them to larger markets in Java, greatly adding to the cost of production. Sale prices achieved during the Qurban Festival will not be achieved at other times of the year. Each location will have a limit to the number of cattle able to be sold during Qurban. For these reasons, companies need to establish a herd size that is matched to potential sales numbers and marketing strategies.

06 Financial outcomes

Cashflow

Cows require a minimum of 1 year to become pregnant and calve. To achieve a suitable return on investment, these calves will normally be 18 to 24 months old before they are sold – nominally at a weight of 275 to 375 kg liveweight. It is rarely possible to generate a profit from the sale of weaners (generally 6 to 12 months old). Therefore, the earliest income generation from normal sales will occur 2.5 to 3 years after start-up. Minor sales of cull cattle may occur before this.

A positive cashflow can be achieved more rapidly by purchasing pregnant cows, even though they will be more expensive than empty cows. The time to first calf will be greatly reduced, saving money on feed and operational costs. Extremely good preparation and planning will be required if a company intends to import pregnant cows as they will be more susceptible than dry cows to stress and poor management. The potential advantages of purchasing pregnant cows will disappear rapidly if stock losses occur. The option of purchasing dry or pregnant BX breeders from Indonesian feedlots should also be considered. These breeders will have already some level of adaptation to the Indonesian climate and transportation to SISKA locations will be relatively short in comparison to the sea voyage from Australia.

The achievement of a positive cashflow is highly affected by the cattle sales' revenue, which must exceed capital expenditure, assets reconditioning and feed and operational expenses. Whilst achieving an early positive cashflow may be appealing, it does not guarantee the greatest financial outcomes. It is important to consider the weight at which cattle will be sold as well as the strategy to scale up herd size, both of which impact the value of early sales.

Internal rate of return

The Internal Rate of Return (IRR) for an investment is the percentage rate earned on each dollar invested for each period it is invested. Investors will naturally expect to achieve an IRR that is greater than the interest rate cost of capital investment. We suggest that the IRR for a cattle breeding business should exceed 5%¹², although Indonesian business investors are more likely to expect an IRR of greater than 10%¹³.

The calculation of IRR is based on cash flow over a fixed time period. Taking into account the relatively long cycle of cattle breeding business, IACCB has used 10 years from start-up as the investment period. IRR also includes a terminal value calculation at the end of year 10.

The projections for cashflow and IRR take into account livestock productivity data such as calving rate, calf and weaner mortality rate, average daily gain (ADG), percentage / number of culled cows, percentage / number of retained female calves (heifers), and livestock sale strategies (including cattle category and selling age). The projections also consider income and expenditure factors, including feed costs and estimated selling price per livestock category. Other calculations include additional investment in supporting infrastructure and additional livestock purchases to grow the herd or replace culled and unproductive cows and bulls. CALFIN supports examination of price and other assumptions using a sensitivity analysis function.

¹² Refer to the Project Design Document, DFAT, October 2015

¹³ Discussion with owners/managers of IACCB Partners

07 Scaling up a SISKa enterprise

One of IACCB's partners developed a business strategy that required growing the herd from an initial 300 to approximately 1,000 breeders. Accordingly, all of the heifers produced were retained and only cull cows and bulls were sold. Herd size reached 750 breeders by the end of 3rd year. As a result, income from cattle sales would not be expected to exceed expenditure until year 4 after start-up. Land allocated to accommodate the increased herd has also been expanded from 1,600 ha to 5,000 ha.

With a large number of grower bulls aged 24 months or older, the company will sell approximately 150 head in year 4. Part of the stock will be sold during the Qurban Festival, when cattle selling price is very high. Based on this strategy, the company is projected to generate a cash flow surplus of approximately IDR 450 million by the end of 2020 (4th year of production) (Figure 2).

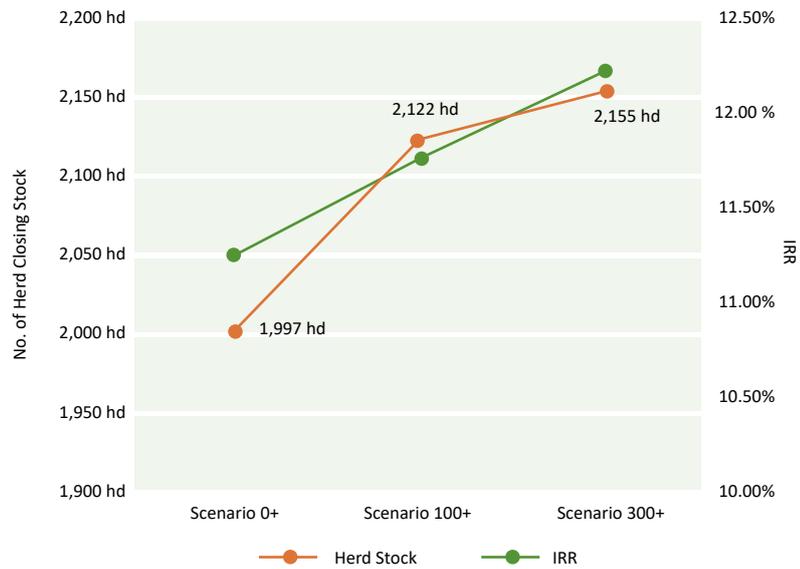
Figure 2. Cash Flow (in thousand IDR)



IRR of scale-up options

Three scenarios were developed to determine options for company's business growth, from 2020 to 2026. The general assumptions for these three scenarios were a calving rate of 70%-74%, a calf mortality rate of 5%, grower mortality rate of 3%, ADG of 0.44-0.47 kg, and 75%-95% of heifers retained. The first scenario assumed organic growth, where heifers were retained and used as breeders as they become available and slowly grow the herd size (**Scenario 0+**). The second scenario was based on a combination of organic growth (retention of heifers to become breeders) and the purchase of additional 100 pregnant cows in 2020 to rapidly increase the herd size (**Scenario 100+**). The third scenario combined an organic growth strategy with the purchase of an additional 300 pregnant cows in 2020 to further accelerate the expansion of herd size (**Scenario 300+**).

Figure 3. IRR vs Closing Stock in Year 10



Not surprisingly, a faster scale-up of herd size required greater investment, however this resulted in a better return on investment over the 10-year period (Figure 3). By adding 300 pregnant cows in 2020 (Scenario 300+), the projected closing stock in 2026 was 2,155 head, with projected IRR of 12.2%. Scenario 0+ delivered a projected herd size of 1,997 head in 2026 and an IRR of 11.2%. The 100+ scenario delivered a projected IRR of 11.8% with herd closing stock of 2,122 head. Larger herd sizes offer efficiencies of scale, resulting in higher IRRs.

08 Conclusions

The SSKA model of cattle breeding has the potential to be profitable for commercial companies, generating an IRR on investment of 12 to 16%, becoming cash-flow positive in Year 3 or 4 after start-up and reducing weed control and fertiliser costs for the plantation. SSKA operations can produce feeder cattle at least 16% cheaper than imported feeders (based on the lowest 2019 cost of imported BX feeder delivered to West Java).

These financial projections are entirely dependent on good planning and management.¹⁴ A crucial part of this is the ability to achieve synergies between the cattle and plantation components. Failure to commit the necessary financial resources during the start-up phase will generally result in a decline in livestock performance and negatively impact animal welfare. Restoring the condition and performance of under-fed cattle takes a lot of money and time and will greatly reduce the overall profitability of the enterprise.



IACCB notes the following critical steps in ensuring success, all of which relate to careful planning, consistent professional management and quick response to emerging issues



Ensure that financial resources are available to complete the start-up phase.



Engage skilled, experienced staff to manage the cattle operation and continuously train staff to improve their ability to manage cattle.



Know what grazing resources will be usable and how many cattle they are likely to support.



Prepare for calving and management of animal health issues. Have cows supervised full time by staff, preferably para-vets, who can address problems quickly. Cows and calves can die quickly in Indonesia's extreme weather.



Feed cattle properly, including the provision of palm kernel cake on a daily basis - breeders will not be productive if solely reliant on grazing under palms.



Ensure three-monthly data collection through pregnancy tests, ADG calculations, BCS monitoring, and others.



Have a store of concentrate feeds available to cover very dry and very wet periods.

¹⁴ IACCB has developed CALFIN (Cow-calf Operations Financial Model) as a supporting tool to inform the decision making for investors or business actors who want to start cattle breeding business. This MS Excel spreadsheet is expected to reduce the complexity required to undertake the commercial viability assessment of cattle breeding business. CALFIN can be downloaded at www.iacccb.org and www.redmeatcattlepartnership.org

More generally, strategic management decisions need to be supported by a proper recording system that enables gradual improvement of performance and productivity. IACCB has developed CALPROS (Cow-calf Operations Recording Spreadsheet), a tool to record cattle productivity, enriched with an interactive dashboard to facilitate the analysis of productivity measures. CALPROS can be downloaded: www.iaccbp.org or <https://www.redmeatcattlepartnership.org/>

To get more information on IACCB's experience with the SISKA model please watch the video through following link: <http://bit.ly/SISKA-Model>

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OFFICE
Perkantoran Hijau Arkadia Tower F,
2nd floor unit 204
Jl. TB Simatupang Kav. 88 Jakarta 12520,
Indonesia