

# Sri Lanka Journal of Food and Agriculture (SLJFA)

ISSN: 2424-6913  
Journal homepage: [www.slcarp.lk](http://www.slcarp.lk)



## Research Paper

# Cost benefit analysis on establishing a machinery hiring-out centre in Sri Lanka

K. G. C. D. B. Wijesinghe\*, G. L. Nagahawaththa, R. B. T. M. Radeniya and D. M. B. Priyadarshani

Socioeconomics and Planning Centre, Department of Agriculture, Peradeniya, Sri Lanka

\* Corresponding Author: [kgchamarasepc@gmail.com](mailto:kgchamarasepc@gmail.com)



<https://orcid.org/0000-0001-6525-3752>

### Article History:

Received: 25 July 2019

Revised form received: 16 September 2019

Accepted: 20 December 2019

**Abstract:** Reduction of labour is one of the major concerns in the recent past in the agriculture sector of Sri Lanka recent past. Agriculture has become less attractive to youth. Even though mechanization will be one of the better solution to overcome this problem, high cost of capital requirement restricts small land owners to move into mechanization.

The Department of Agriculture (DOA) has identified this issue and proposed to establish machinery hiring-out centres to enable the farmers to obtain services at a reasonable rate. This study aimed at estimating the financial feasibility and economic feasibility of hiring-out centres over the project economic life of 10 years. Financial feasibility analysis included financial statement analysis, net project worth assessment and sensitivity analysis. For the purpose of economic analysis, financial prices were converted to shadow prices using the shadow exchange rates and project worth was recalculated. In project analysis, it is common to have multiple IRR rates, which was answered with MIRR estimation representing the actual IRR. Results of the study revealed that the project is financially viable and generates positive net income of Rs. 27 million annually throughout the period, generation of net cash inflow of Rs. 257.7 million, and accumulation of net assets of Rs. 277.7 million. Project worth analysis resulted in a positive financial NPV of Rs. 7.6 million, IRR of 19%, MIRR of 13% and a B/C ratio of 1.03. However, the IRR value and B/C ratio is contradictory to each other due to multiple IRR values and limited time frame of analysis of 10 years and this was addressed through MIRR measure, which is the optimal IRR value of the project and is consistent with the B/C ratio. Economic feasibility analysis showed a positive ENPV of Rs. 10.1 million, EIRR of 28%, EMIRR of 18% and a B/C ratio of 1.05. The study concluded that establishment of a machinery hiring-out centre is feasible at financial and economic conditions in a minimal risk environment. Consequently, government may have a role in facilitating the project implementation with suitable subsidy scheme till the project maturity. Development of a suitable implementation design would be the next step such as a PPP model.

**Keywords:** Financial Feasibility, Economic Feasibility



This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

## Introduction

Reduction of the labour force in agriculture has become a major concern in the Sri Lankan agriculture sector. With youth moving away from the sector over past few decades, the present agriculture labour force is 25.5% of total labour force (DCS, 2018). Mechanization could be a

solution to overcome this issue through programs such as 'Yaya 2' programme where mechanization is done for combined land parcels.

A recent study has shown replacement of labour in specific crop operations (e.g. land preparation,

harvesting and processing in paddy) and machine usage has increased from 20% to 55% over the period of 1980 to 2013 (Abeyratne, 2017). The Food Agriculture Organization (FAO) of the United Nations has identified a machinery multiform system, which has four categories, namely, pool of machinery owned individuals, joint ownership (corporative), commercial enterprises (full time or part time service contractors), and hiring, renting or leasing schemes offered by dealers or corporative (FAO, 1981). Abeyratne (2017) also reported of another classification based on origin of machinery imported, namely, locally manufactured, and imported equipment modified by farmers locally, where imported machinery are the most common.

Among all machinery, tractors are the most common among Sri Lankan farmers and Sri Lanka custom data shows that tractor availability has increased during the period 1991 to 2001 at a rate of 3.4% (Agriculture tractors: FAO web). The registered number of tractors in Sri Lanka by 2015 was 343,263 (Abeyratne, 2017). From 2015 to 2017, other agriculture machinery imports have increased, namely, seeders and transplanters from 120 to 2,574, combined harvesters and threshers from 1,079 to 23,192 and root and tuber harvesting machines from 4 to 4,406 (Sri Lanka Customs - unpublished reports).

The IFPRI (2015) reported that more than 80% tillage functions are mechanized in Sri Lanka however, machinery usage in the country is

## Methodology

Total project investment worth Sri Lankan Rupees (LKR) 16 million (Table 1). Machinery hiring-out centre provided a timely service by hiring out its owned machinery to farmers at a reasonable rate. The machineries hired out by the centre amounted to LKR 10.7 million, including those used for land preparation, harvesters, processor, etc. as reported by Sidhu and Vatta (2012).

For this study, the technical information (operating time per batch, operating cost, useful life of the machines and maintenance cost) and prices of

relatively low compared to other Asian and South Asian countries. The major reason for such low usage of machinery in the field is the high capital cost, and the drivers for mechanization are high cost of labour, unwillingness of youth for agriculture and ageing population. Further, the present hire market is not properly distributed, the high value machinery is only with large farmer, and most of the past mechanized systems operated by state-owned corporations and cooperatives have failed.

Deraniyagala (2001) reported that there is significant impact of agriculture machinery on technology accumulation. Abeyratne (2017) revealed that there is a significant increase in demand for agriculture machinery among small agriculture holdings, while Samarappuli (2002) reported that there is a significant investment opportunity in agriculture machinery in Sri Lanka. Further, agriculture machinery has been recognized as one of the productivity improvement technologies (Gamage, 2002).

Abeyratne (2017) further suggested that individuals or group ownership, public private partner ships (PPP) and soft loan schemes to promote mechanization in agriculture. In this context, the Department of Agriculture (DOA) of Sri Lanka has proposed to establish machinery hiring-out centres to encourage machinery use in agriculture operations. This study evaluates financial and economic feasibility for a machinery hiring-out centre.

machinery were obtained Farm Mechanization Research Centre (FMRC) Mahalluppallama, building construction expenses, costs on office equipment and respective useful lives were obtained from engineering division of DOA. Costs on land obtained comparing with available market rates.

Working capital calculation and expenses during construction were calculated according to the industry standards obtained from FMRC and engineering division of DOA. Machinery hiring out

rate was obtained from the cost of cultivation (COC) survey reports (DOA, 2017) and the number of operating days per machine was calculated based

on the cropping calendar of DOA; *i.e.* tractors will be operated for maximum of 2 months per season for land preparation in paddy.

Table 1: Project Investment cost ('000 LKR)

Item	Local	Foreign	Total
<u>Fixed Assets</u>			
Land	800		800
Buildings & construction	1,000		1,000
Mould board plough for Four wheel tractors		120	120
Rotovators with four wheel tractors		250	250
Seed paddy cleaners (electric motor driven)		200	200
Seed paddy cleaners (two wheel tractor driven)		180	180
Lowland motorized weeding machines		35	35
Highland inter-cultivators		120	120
Drum seeder for paddy		30	30
Box seeder for paddy		25	25
Motorized weeder for paddy		110	110
Mushroom media filling machine		300	300
Tractor coupled seeders		100	100
Motorised Paddy trans planter		500	500
Axial flow water pumps two wheel tractor driven		80	80
Axial flow water pumps Four wheel tractor driven		150	150
High pressure sprayers for orchards		25	25
Combine harvester		5,000	5,000
High capacity Maize shellers		500	500
Cow pea thresher		400	400
Finger millet thresher		150	150
B Onion seed extractor		350	350
Ground nut harvester		500	500
Groundnut pod removers		800	800
Groundnut shellers (electric motor driven)		300	300
Pulse grading and processing machine (electric motor-driven)		130	130
Grass mover attachments to four wheel tractors		300	300
Total machinery		10,655	10,655
Office equip and furniture		150	150
Total fixed assets	1,000	10,805	12,605
<u>Pre-operational Costs</u>			
Expenses during construction	100		100
Interest during construction	675		675
Total Pre-operational Costs	775	0	775
<u>Working capital</u>			
Inventory	1,965		1,965
Cash liquidity	666		666
Total working capital	2,631	0	2,631
Total of Investment Costs	4,406	10,805	16,011

Required human resources and their salary and wages are shown in Table 2. The salary and wages were obtained from the labour demand survey

(DCS, 2017) and 25% incentive was considered as deductions for Employee Provident Fund (EPF) and Employee Trust Fund (ETF).

Table 2: Human resource requirement

Category	Number	Monthly Salary ( LKR)
Manger	1	60,000
Technical officers	3	40,000
Drivers / Operators	10	30,000
Labourer (unskilled)	2	25,000

Demand analysis for the project was not done as past studies have shown there is potential to increase the use of machinery in agriculture. Discount rate was used for calculation of the

present values and rate representing the cost of capital of the project, and was calculated using the weighted average cost of capital (WACC) of equity and loans (Equation 1; Farber *et al.*, 2006);

$$WACC = \frac{D*r+E*i}{I} * 100 \text{ ----- Equation 1}$$

where, D= Loan value, r= Loan rate, E= Equity (Own finance), and i= Equity cost of capital. The equity cost of capital is the cost of capital of own finance

(opportunity cost of capital), which was calculated using the capital assets pricing model (CAPM) (Equation 2; Kisman and Shintabelle, 2015);

$$CAPM = r_f + (r_m - r_f) * \beta \text{ ----- Equation 2}$$

where,  $r_f$  = Risk free interest rate (Treasury bill rate),  $r_m - r_f$  = Market risk premium,  $\beta$  = beta factor (performance compared to bench mark of 1).

net flow of the project (cash flow statement)

Equity risk rates were calculated for different countries and equity risk for Sri Lanka obtained as 12.2% (Country Default Spreads and Risk Premiums, 2019). In project analysis, internal rate of return (IRR) is one of the most important measure of project worth, nevertheless subjected to problem of multiple optimal solutions (multiple IRR) and thus, Modified Internal rate of return (MIRR) was used to correct the problem. However, MIRR requires reinvestment rate and for calculation of optimal IRR, and thus, the weighted average cost of capital was used as reinvestment rate (Kierulff, 2008).

- (2) Financial measures of project including four major parameters, namely, (a) internal Rate of Return (IRR), which is the discount rate that makes the discounted net present values of benefits after costs equal to be zero, project is accepted when IRR is more than or equal to the cost of capital. (b) Net Present Value (NPV), which is the difference between the present value of cash inflows and the present value of cash outflows, project is accepted when value is positive, (c) Cost Benefit Ratio (B/C ratio), which is the ratio between discounted cash Inflows over discounted cash outflows, project is accepted only when ratio is  $\geq 1$ , and (d) Payback Period, which is the number of the years the cumulative net cash flows of the project equal the initial investment cost. It indicates the number of years in which the project is in risk. Two cases of project worth with and without finance were calculated.

Financial feasibility of the project

The financial feasibility study consists of three major components, namely,

- (1) A financial statement analysis including measuring of profitability throughout project economic life span (income and expenditure statement), financial position of the project (balance sheet) and real cash

- (3) Sensitivity analysis to measure the financial feasibility of the project under

unfavourable conditions that exist during economic period of the project. It was tested for three situations, namely (a) Increase in all operation costs by 5% (Sensitivity 1), (b) Decrease in product Prices by 5% (Sensitivity 2), and (c) Increase in costs by 5% and decrease product prices by 5% (Sensitivity 3)

*Key assumptions:* The operating time of each machine was assumed as 8 hrs and operating days per month as 30 days, while the number of operating months was calculated based on cropping calendar. Further, the machinery hiring centre was assumed not to have a significant impact on the existing demand for machinery. The loan amount was expected to be LKR 10 million, been is a subsidized loan obtained at rate of 6.75% (“*Jaya Isura*” loan scheme 1) repayable in seven years including a grace period of one year, *i.e.* the operating cost of the machines that has not given the expected performances similar to other types of machines.

For pricing, the operating margin was used as 55% on operating costs. Tax exemption was expected to be given throughout the project economical life, and was considered to be 10 years. Gryglewicz *et al.* (2008) showed that the economic life of a project is finite and is in the range of 10 to 35 years. The calculated revenue and operating costs for machinery hiring centre are shown in Table 5.

Economic feasibility

Economic analysis measures economic contribution of the project to the society and rationality of requisite resources allocation to the project and discounted measures of project worth were used to estimate returns. Analysis include two steps, namely (1) adjustments to transfer payments- for this project loan effect was removed, and (2) both input and output of the project were categorized into tradable and non-tradable items (Table 3), where market prices of all non-tradable items were multiplied with standard conversion factors (Table 4) for Sri Lanka calculated by the Asian Development Bank (ADB, 2004).

Table 3: Tradable and non-tradable inputs

<b>Input</b>	<b>Tradable</b>	<b>Non-tradable</b>
Land		Yes
Building		Yes
Machinery	Yes	
Labour	Yes	
Fuel	Yes	
Lubricants	Yes	
Furniture and fittings	Yes	
Water		Yes
Electricity		Yes

Table 4: Shadow price calculation

<b>Item</b>	<b>SCF/SWRF*</b>	<b>SCF value</b>	<b>Shadow Price</b>	<b>ADB Project reference</b>
Labour - Unskilled	SWRF	0.75	SCF*SWRF	Southern Province Rural Economic
Other non-tradable items	SCF	0.9	SCF	Advancement Project, 2001

\* SCF = standard conversion factor; SWRF = Shadow Wage Rate Factor

All the adjusted cash flows using the shadow exchange rates were discounted using Social Discount Rate (SDR) use for the economic analysis

was 12% of India (ADB,2013) and IRR, MIRR, NPV, PBP and B/C ratios were recalculated.

Table 5: Revenue and operating costs of machinery hiring centre

Item	Capacity per hour		Months	Operating cost per hour (LKR)	Total Operating cost (Rs '000)	Revenue	
	Unit	Capacity				Price (Rs /hour)	Revenue (Rs '000)
Mould board plough for Four wheel tractors	ac	0.6	4	1,372.16	1,317	2,127	2,042
Rotavators with four wheel tractors	ac	0.5	4	1,995.72	1,916	3,093	2,970
Seed paddy cleaners (electric motor driven)	kg	120	1	167.6	40	260	62
Seed paddy cleaners (two wheel tractor driven)	kg	120	1	167.6	40	260	62
Lowland motorized weeding machines	ac	0.1	8	467.92	898	725	1,393
Highland inter-cultivators	ac	0.1	2	391.67	188	607	291
Drum seeder for paddy	ac	0.2	2	70	34	109	52
Box seeder for paddy	ac	0.2	2	70	34	109	52
Motorized weeder for paddy	ac	0.1	6	467.92	674	725	1,044
Mushroom media filling machine	bag	150	12	245.2	706	380	1,095
Tractor coupled seeders	ac	0.5	2	973.2	467	1,508	724
Motorised Paddy transplanter	ac	0.4	2	1524.67	732	2,363	1,134
Axial flow water pumps (two wheel/four wheel tractor driven) two wheel tractor driven	300,0 00l	1	8	799.8	1,536	1,240	2,380
Axial flow water pumps (two wheel/four wheel tractor driven) Four wheel tractor driven	300,0 00l	1	8	799.8	1,536	1,240	2,380
High pressure sprayers for orchards	ac	1.0	12	799.8	2,303	1,240	3,570
Combine harvester	ac	0.8	4	3,875.54	3,721	6,007	5,767
High capacity Maize sheller	kg	3.5	4	1,482.93	1,424	2,299	2,207
Cow pea thresher	kg	0.9	4	1,099.8	1,056	1,705	1,637
Finger millet thresher	kg	0.7	4	1,099.8	1,056	1,705	1,637
Big Onion seed extractor	kg	20	4	386.93	371	600	576
Groundnut harvester	ac	0.5	4	800	768	1,240	1,190
Groundnut pod removers	ac	1.0	4	1,316.53	1,264	2,041	1,959
Groundnut shellers (electric motor-driven)	kg	450	4	925.33	888	1,434	1,377
Pulse grading and processing machine (electric motor-driven)	kg	50	4	351.8	338	545	523
Grass mover attachments to four wheel tractors	ac	1.5	8	766.27	1,471	1,188	2,280
Total					24,777		38,405

## Results and Discussion

### Financial statement analysis

Cash flows of the machinery hiring centre are shown in Table 6, fund flow statement and discounted analysis of the financial cash flows are shown in Table 7. Income statement of the project illustrates the annual income tax exempted profit of Sri Lanka Rupees (LKR) 26.6 million in year 1 and LKR 27.5 million at the end of economic life of the project (Annex 1).

The results revealed that the project has generated net income during the considered period of time. Cash flow statement (Table 6) showed that the sources of funds and their applications of the project, revealing liquidity of the project due to net positive accumulation of funds. Project balance sheet statement showed the financial position of

the project, showing a strong financial position at the end of the project of LKR 277.7 mn (Annex 1).

### Financial Measures of Project Worth

The calculated financial measures of project worth IRR, MIRR, NPV, PBP and B/C ratio are shown in Table 7. The NPV of the project is positive and the calculated IRR was higher than the cost of capital revealing the profitability of the project. A greater NPV and IRR in the financing option compared to the self-financing option suggest that a mixed financing option would be most suited. Moreover, the B/C ratio > 1 showed that the project has high social benefit such as creation of employment, etc. However, there is a mismatch between IRR and B/C ratio due to multiple IRR, and consequently B/C ratio compared with MIRR, which is consistent with the results.

Table 7: Financial project worth at 8.8% cost of capital

Measure	Without finance	With finance
Internal Rate of Return (IRR)	19%	36%
Modified Internal Rate of Return (MIRR)	13%	16%
Pay Back Period (PBP) in years	5.29	2.74
Net Present Value (NPV) (LKR '000)	7,621	8,726
Net Present Value of benefits (NPVb) (LKR '000)	231,721	240,912
Net Present Value of costs (NPV c) (LKR '000)	224,100	232,186
Benefit/Cost (B/C) Ratio	1.03	1.04

### Sensitivity analysis

The results of the Sensitivity analysis are shown in Table 8. The results revealed that the product prices are sensitive more than the input prices.

Moreover, low MIRR values and negative NPV values indicate that the project may not profitable under adverse conditions.

Table 8: Project sensitivity

Item	Sensitivity 1		Sensitivity 2		Sensitivity 3	
	Without loan	With loan	Without loan	With loan	Without loan	With loan
IRR	4.0%	3.1%	3.3%	1.8%	-12.7%	-18.7%
MIRR	6.7%	6.8%	6.3%	6.3%	-4.3%	-4.3%
PBP	24.8	32.7	30.7	56.5	-7.9	-5.4
NPV ('000)	-3,676	-2,467	-3,966	-2,860	-15,171	-14,010
B/C Ratio	0.98	0.99	0.98	0.99	0.94	0.94

IRR == internal rate of return; MIRR = Modified Internal Rate of Return; PBP = Payback period (years); NPV = Net present value; B/C ratio = benefit/cost ratio

Table 6: Fund flow statement

Item	Year ending on 31 <sup>st</sup> December (Sri Lanka Rs '000)											
	Current year	Future Years										
	0	1	2	3	4	5	6	7	8	9	10	
<u>Cash inflow</u>												
Current revenue		38,405	38,405	38,405	38,405	38,405	38,405	38,405	38,405	38,405	38,405	38,405
Total funds from operation		38,405	38,405	38,405	38,405	38,405	38,405	38,405	38,405	38,405	38,405	38,405
Working Capital Recovery												2,631
Residual value of project assets												5,284
Total cash inflow without finance	0	38,405	38,405	38,405	38,405	38,405	38,405	38,405	38,405	38,405	38,405	46,320
<u>Cash outflow</u>												
Working capital	2,631											
Investment in fixed assets & replacement	12,605			5,655		5,000	5,655			5,655		
Pre-prod. & prod. expenses	775	33,058	33,058	33,058	33,058	33,058	33,058	33,058	33,058	33,058	33,058	33,058
Payment of Tax	0	0	0	0	0	0	0	0	0	0	0	0
Total cash outflow without finance	14,046	33,058	33,058	38,713	33,058	38,058	38,713	33,058	33,058	38,713	33,058	
Net cash flow without finance	-14,046	5,347	5,347	-308	5,347	347	-308	5,347	5,347	-308	13,262	
Loan	10,000											
<u>Debt Service</u>												
Interest		675	580	479	370	255	132					
Principal			1,407	1,502	1,603	1,711	1,827	1,950				
Total Debt		675	1,987	1,980	1,974	1,966	1,958	1,950				
Total cash inflow with finance	10,000	38,405	38,405	38,405	38,405	38,405	38,405	38,405	38,405	38,405	38,405	46,320
Total cash outflow with finance	14,046	33,733	35,045	40,693	35,031	40,024	40,671	35,008	33,058	38,713	33,058	
Net cash flow with finance	-4,046	4,672	3,360	-2,289	3,373	-1,619	-2,267	3,397	5,347	-308	13,262	



### Economic Analysis

Results of the economic analysis (Table 9), at social discount rate of 12%, revealed significant net

positive economic benefits to the society having higher EIRR, EMIRR, ENPV and B/C ratio.

Table 9: Economic project worth at social discount rate of 12%

Measure	Value
Economic Internal Rate of Return (EIRR)	28%
Economic Modified Internal Rate of Return (EMIRR)	18%
Pay Back Period (PBP) in years	3.52
Economic Net Present Value (ENPV) (LKR '000)	10,089
Economic Benefit/ Cost (B/C) Ratio	1.05

### Conclusion

The IRR values of the project and B/C ratio are not consistent due to multiple IRR values and limited time frame of 10 years, which was rectified with the MIRR, the real IRR value. The project to establish a machinery-hiring centre has generated significant financial and economic net benefits and hence, investment is worthy. However, project is unable to bear the significant adverse conditions and thus,

requires stronger mechanism to address the issue. Provision of a suitable subsidy scheme for the project until its maturity and facilitation of the approval procedure of the project for the second phase by designing a project implementation plan through mechanisms through a Private Public Partnership (PPP) is recommended.

### Acknowledgements

Contribution made by the staff of the Farm Machinery Research Centre (FMRC) and the Engineering Division of the Department of

Agriculture by providing technical information is highly appreciated.

### References

- Abeyratne F. (2017): Small farm agriculture mechanization in Sri Lanka its growth and constraints: <https://www.slideshare.net/essp2/small-farm-agriculture-mechanization-in-sri-lanka-its-growth-and-constraints-81495679> (Accessed on 18.08.2019)
- FAO (2001): Agricultural tractors number in use data table, 1991-2001, Food and Agriculture Organization of the United Nations: <http://www.fao.org/docrep/004/ad452e/ad452e0c.htm#TopOfPage> (Accessed on 06.01.2019)
- Biggs S. and Justice S. (2015): Rural and agricultural mechanization a history of the spread of small engines in selected Asian countries: [https://csisa.org/wpcontent/uploads/sites/2/2014/06/BiggsJusticeIFPRI\\_DP\\_01443.pdf](https://csisa.org/wpcontent/uploads/sites/2/2014/06/BiggsJusticeIFPRI_DP_01443.pdf) (Accessed on 05.01.2019)
- DOA (2017): Cost of cultivation survey reports, Department of Agriculture, Peradeniya, Sri Lanka
- Country Default Spreads and Risk Premiums (2019): [http://pages.stern.nyu.edu/~adamodar/New\\_Home\\_Page/datafile/ctryprem.html](http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html) (Accessed on 04.01.2019)
- Deraniyagala S. (2001): The impact of technology accumulation on technical efficiency an analysis of the Sri Lankan clothing and agricultural machinery industries: <http://unpan1.un.org/intradoc/groups/public/documents/APCITY/UNPAN012786.pdf> (Accessed on 17.08.2019)
- Farber A., Gillet R. and Szafarz A. (2006): A general formula for the WACC: <https://www.ssrn.com/abstract=898420> (Accessed on 18.08.2019)
- Gamage D. (2002): Little space for manoeuvring agrarian structure land tenure regimes and agrarian development in Sri Lanka: <http://>

- dl.nsf.ac.lk/ohs/harti/18656.pdf (Accessed on 17.08.2019)
- Gifford R.C. (1981): Agriculture mechanization in development guidelines for strategy formulation, Food and Agriculture Organization of the United Nations: <http://www.fao.org/3/a-be821e.pdf> (Accessed on 05.01.2019)
- Gryglewicz S., Huiseman J.M.K. and Kort P.M. (2008): Finite project life and uncertainty effects on investment: <https://personal.eur.nl/gryglewicz/files/finlife.pdf> (Accessed on 18.08.2019)
- Gunathilake H., Berg C.V.D., Guzman F.D., Martin A.L., Liang Z., Lin T., Logarta V., Nam K.Y., Pattanayak S., Perera P., Poot L., Weiss J., Yang J.C. and Zhuang J. (2013): Cost benefit analysis for development: a practical guide, ADB: <https://www.adb.org/sites/default/files/institutional-document/33788/files/cost-benefit-analysis-development.pdf> (Accessed on 08.01.2019)
- Kierulff H. (2008): MIRR a better measure: <https://www.sciencedirect.com/science/article/pii/S0007681308000359> (Accessed on 25.08.2019)
- Kisman Z. and Shinatabelle R. M. (2015): The validity of capital assets pricing model (CAPM) and arbitrage pricing theory (APT) in predicting the return of stocks in Indonesia stock exchange 2008-2010: <files.aiscience.org/journal/article/pdf/70200023.pdf> (Accessed on 17.08.2019)
- Martin A.L. (2004): shadow exchange rates for project economic analysis towards improving practice at the Asian development bank, ADB: <https://www.adb.org/sites/default/files/publication/29856/tn-11-shadow-exchange-rates.pdf> (Accessed on 08.01.2019)
- Sri Lanka Customs (2018): Machinery Imports, 2015-2018. Sri Lanka Customs, Colombo
- Samarappuli N. (2002): Private sector investment in agriculture constraint and opportunities: <http://dl.nsf.ac.lk/ohs/harti/18656.pdf> (Accessed on 17.08.2019)
- Sidhu R.S. and Vatta K. (2012): Improving economic viability of farming a study of cooperative agro machinery service centres in Punjab: <https://pdfs.semanticscholar.org/bb2c/464397124cc3f00d3dc0ba6a64da695f1ade.pdf> (Accessed 17/082019)
- DCS (2017): Sri Lanka labour demand survey – Annual bulletin. Department of Census and Statistics: [www.statistics.gov.lk/industry/Labour\\_Demand\\_Survey\\_2017\\_Report.pdf](http://www.statistics.gov.lk/industry/Labour_Demand_Survey_2017_Report.pdf) (Accessed on 17.08.2019)
- DCS (2018): Sri Lanka labour force survey: annual bulletin. Department of Census and Statistics: <http://www.statistics.gov.lk/page.asp?page=Labour%20Force> (Accessed on 17.08.2019)

**Annex 1**

A1. Income and expenditure statement

Item	Year ending 31 <sup>st</sup> December (Future years)						
	1	2	3	4	5	6	7 to 10
	Sri Lanka Rs. '000						
<u>Sales:</u>	38,405	38,405	38,405	38,405	38,405	38,405	38,405
<u>Cost of sales:</u>							
<u>Operating cost</u>							
Wages	7,050	7,050	7,050	7,050	7,050	7,050	7,050
<u>Overheads:</u>							
Utilities	20	20	20	20	20	20	20
Repair & maintenance	117	117	117	117	117	117	117
Depreciation	1,651	1,651	1,651	1,651	1,651	1,651	1,651
Total overheads	1,788	1,788	1,788	1,788	1,788	1,788	1,788
Total cost of sales	8,838	8,838	8,838	8,838	8,838	8,838	8,838
Gross profit/loss:	29,567	29,567	29,567	29,567	29,567	29,567	29,567
<u>Operating expenses:</u>							
Salaries	900	900	900	900	900	900	900
General expenses	96	96	96	96	96	96	96
Insurance	118	118	118	118	118	118	118
Marketing Expenses (2.5% on sales)	960	960	960	960	960	960	960
Total operating expenses	2,074	2,074	2,074	2,074	2,074	2,074	2,074
<u>Operating profit/loss:</u>	27,492	27,492	27,492	27,492	27,492	27,492	27,492
<u>Other expenses:</u>							
Interests	675	580	479	370	255	132	
Amortization	155	155	155	155	155		
Total other expenses	830	735	634	525	410	132	
Net profit/loss:	26,662	26,757	26,859	26,967	27,082	27,361	27,492

**A2: Cash flow statement**

Item	Year ending at 31 <sup>st</sup> December (Sri Lanka Rs. '000)											
	Current year	Future Years										
	0	1	2	3	4	5	6	7	8	9	10	
<b>Sources of funds:</b>												
Operating profit/loss		27,492	27,492	27,492	27,492	27,492	27,492	27,492	27,492	27,492	27,492	27,492
Add back: Depreciation		1,651	1,651	1,651	1,651	1,651	1,651	1,651	1,651	1,651	1,651	1,651
Total funds from operation		29,144	29,144	29,144	29,144	29,144	29,144	29,144	29,144	29,144	29,144	29,144
Commercial bank loans	10,000											
Paid-up capital	6,011											
Total sources of funds	16,011	29,144	29,144	29,144	29,144	29,144	29,144	29,144	29,144	29,144	29,144	29,144
<b>Application of funds:</b>												
Operating expenses:												
Investment in fixed assets	12,605			5,655		5,000	5,655			5,655		
Pre-production expenses	775											
Interest on bank loans		675	580	479	370	255	132					
Repayment of bank loan			1,407	1,502	1,603	1,711	1,827	1,950				
Increase of current assets (other than cash)	1,965	-										
Total application of funds	15,345	675	1,987	7,635	1,974	6,966	7,613	1,950	-	5,655		-
Cash surplus/deficit	666	28,469	27,157	21,508	27,170	22,178	21,530	27,194	29,144	23,489	29,144	
Cash at the beginning of the year		666	29,135	56,292	77,800	104,971	127,148	148,679	175,872	205,016	228,505	
Cash at the end of the year	666	29,135	56,292	77,800	104,971	127,148	148,679	175,872	205,016	228,505	257,649	

Cost benefit analysis on establishing of machinery hiring-out centre

A3: Balance sheet (all figures are in Rs. '000)

Item	Year ending at 31 <sup>st</sup> December										
	Current year	Future Years									
	0	1	2	3	4	5	6	7	8	9	10
<b>Assets:</b>											
<b>Current assets:</b>											
Cash & bank balance	666	29,135	56,292	77,800	104,971	127,148	148,679	175,872	205,016	228,505	257,649
Inventory	1,965	1,965	1,965	1,965	1,965	1,965	1,965	1,965	1,965	1,965	1,965
Total current assets	2,631	31,100	58,257	79,765	106,935	129,113	150,644	177,837	206,981	230,470	259,614
<b>Fixed assets:</b>											
Fixed assets at cost	12,605	12,605	12,605	12,605	12,605	12,605	12,605	12,605	12,605	12,605	12,605
Less: accumulated depreciation	-	1,651	3,303	(701)	951	(2,398)	(6,401)	(4,750)	(3,098)	(7,102)	(5,450)
Fixed assets net	12,605	10,954	9,302	13,306	11,654	15,003	19,006	17,355	15,703	19,707	18,055
Pre-production expenses	775	775	775	775	775	775	775	775	775	775	775
Less: accumulated amortization	-	155	310	465	620	775	-	-	-	-	-
Preproduction expenses net	775	620	465	310	155	-	-	-	-	-	-
Total assets:	16,011	42,673	68,024	93,381	118,744	144,116	169,650	195,192	222,684	250,177	277,669
<b>Liabilities &amp; equity:</b>											
Current maturities of bank loan	-	1,407	1,502	1,603	1,711	1,827	1,950	-	-	-	-
Total current liabilities	-	1,407	1,502	1,603	1,711	1,827	1,950	-	-	-	-
Long term liability : bank loan	10,000	8,593	7,091	5,488	3,777	1,950	-	-	-	-	-
<b>Equity:</b>											
Paid-up capital	6,011	6,011	6,011	6,011	6,011	6,011	6,011	6,011	6,011	6,011	6,011
Accumulated retained earning	-	26,662	53,420	80,279	107,245	134,328	161,689	189,181	216,674	244,166	271,658
Total equity	6,011	32,673	59,430	86,289	113,256	140,339	167,699	195,192	222,684	250,177	277,669
Total liabilities & equity	16,011	42,673	68,024	93,381	118,744	144,116	169,650	195,192	222,684	250,177	277,669

