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RESEARCH PAPER

Assessing Financial Health of Traditional Red Brick Kilns of Sindh, Pakistan

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ABSTRACT

The objective of this research is to assess financial stability (ratios) and finding optimum debt equity mix, utilization level of labour/capital, availability of investment opportunity and value addition at kilns of Sindh. Sample includes random 90 kilns of (North) Sindh sub divided into small, medium and large sizes. Only three districts are chosen i.e. Khairpur, Sukkur, and Larkana along with *Sindhu* river. Research is applied with already prepared questionnaire form, and survey technique. There are two types of kiln costs, fixed and variable costs. For small, medium and large kilns VC is 27%, 16%, and 12 % of total COGS (Cost of goods sold)(final cost at a kiln), total production of average bricks is 230429, 2465477 and 7147059 bricks, inventory turnover ratio is 10, 9.6 and 8.7, revenue per employee is 93563, 456719 and 566199 rupees, net working capital is 2691000, 2108725 and 3730857 rupees, net profit is 281808, 3647403 and 14908971 rupees, net profit margin is 0.15, 0.21 and 0.29, payback period (months) is 23.6, 26.9 and 8.3, and BCR is 0.27, 0.35 and 0.52. Maintenance cost to total expense ratio is 1.4% on average for the sample of all 90 kilns. On the average brick kiln industry current ratio is 7. Owner of the kiln gets most of the profit .In the end 10000 bricks are sold 1280 times initial cost of procuring clay. There is insignificant relationship between Credit sales and Net profit at a kiln at adjusted R^2 value of 0.018. This industry is labour intensive. Kilns earn by selling bricks as whole lot or in batches because this decreases total spoilage cost. Kilns earn profit by many other activities i.e. via renting assets, advance booking, and selling product directly to consumers without middlemen. Kilns require large initial investment. Kiln industry is dominated by capital lenders. Mostly kiln equity percentage lies between 20-30% of the total debt equity mix. Least owned are large kilns. Sindh kilns are different from Punjab kilns as they lack in use of efficient fuel (coal), eco friendly technology (zig zag) and government kiln registration. There should be a government tax system at each level of brick kiln value chain. Kilns are run without professionalism as all the inputs are either underutilized or over utilized.

Keywords: Kiln Finance, Sindh Kilns, Kiln Investment, Net Profit, Kiln Ratio

Introduction

Pakistan is the third largest producer of bricks in the world. This contributes around 1.5% of GDP (Siriman Naveen, 2016). There are around 20000 brick kilns in Pakistan. There are different types of kilns but usually FCBTK (Fixed Chimney Bull's Trench kilns) are functional in Pakistan on large scale.

Fastest urbanization has been seen in North Sindh recently. It is being changed from rural to urban centre. It was not possible without the boom in the red brick sector of North Sindh. There are at least 3 districts of interest in North Sindh. Sindh population in the latest

census is around 48 Millions (2017 census). People living per house in Sindh are usually 6. Population growth rate of Sindh is 2.41%.

Housing requirement increases 700000 units per annum in Pakistan (NPHP, Pakistan). And to fill this gap Pakistan government has initiated many real estate projects in whole of the Pakistan.

A lot of skilful people of Sindh are associated with this sector of the economy. Making of bricks as well as making of houses require labour. So economically as well as traditionally here people are depending on this sector for their livelihood. In Khairpur a lot of castes are associated with brick making as well as construction of the houses.

High season for brick making starts when there is boom in the construction of houses, apartments, pavements etc in the region. This high season may be summer or winter depending on the economic and fiscal choice of the government of the time. Usually it is summer time. If the fiscal policy of the government is expanding policy it means a boom in the brick sector.

Kilns are as old as bricks. Brick making is very old profession. Demand for bricks affects kiln's size, technology type, area, location, business model, operational capacity, product type and quality, skilled labour, and whole brick value chain. There are three types of kilns i.e. small, medium and large (based on production, acreage, investment and impact on locality).

Kilns are engines of growth for a nation. These help in the conversion of agriculture economy into an industrial economy. Kiln is a factory according to law. Kilns are good places of production, investment, employment and industrial activities. Fuel ,clay, human resources are used to manufacture bricks.

This research of brick sector of construction industry has clear purpose and goals. Some of the objectives are to check

- If North Sindh kilns are financially stable. (ratios)
- Which strategy gives maximum benefit to owner of kiln

1. (Capital $_{vs}$ labour intensive)
2. (selling through agent or by self)
3. (procuring clay/fuel on contract or batch wise)
4. (starting other activity to get more revenue)
5. (equity vs debt preference)

- If starting new kiln is easy.
- If value is added to brick.
- If credit sales has impact on net profit
- If North Sindh is financially different, when compared with Punjab, India and world Brick industry.

Kiln is part of Brick Kiln Value Chain. Raw resources / inputs are acquired from Suppliers. Suppliers of input include Fuel providers, Clay providers, Land providers and Labour providers (*Jamadars*) etc. Inputs are converted into finished / final goods (i.e. Bricks) and sold to either consumers or sales agents. Usually kilns sell to sales agents. Clay providers add value to clay. It is first value addition step.

Literature Review

BCR, profit, change ratio, cash value of cow dung fuel, and ratio of agricultural activities versus brick making activities are calculated. (Abdalla et al, 2012).

Profit = Total return – Total cost

Benefit Cost Ratio = Total revenue / Total cost

Change Ratio = 100 * (End of season Price – Beginning of season price) / Beginning of season Price

Table 1
Mean socioeconomic characteristics of 49 kilns of Sudan (Abdalla et al, 2012).

Parameters	Mean/%
Age (Years)	44.7(9.3)
Family Size (members)	7.3(2.4)
No of working months	9.8(1.2)
Education (%)	77
main activity(%)	
Brick making	86
Other	14
Land ownership(%)	
Own Land	16
rented land	79.5
N both(own and rented)	4.5
kiln Number(%)	
one brick kiln	86
more than one kiln	14

Inputs used were dung, wood, clay and labour. Their costs and benefits were calculated separately. From late July to end of September it was considered off season or dry season. While production season starts from October to July each year. And in both seasons input and output change accordingly. Following was data associated with inputs. (Abdalla et al, 2012). Input prices of dung increase during off season and increase with the start of production season. Wood prices remained stable. (Abdalla et al, 2012).

Table 2
Prices of inputs for 49 kilns at Khartoum (Abdalla et al, 2012).

Parameters	% of kiln	Mean	Change ratio (%)
Loose dung			
Beginning of season	96	42.6(5.7)	
Middle of season	92	55.1(7.3)	
End of season	100	70.3(7.2)	65
Average Prices	100	55.1(4.6)	
Compacted Dung			
Beginning of season	85	15.8(2.6)	
Middle of season	92	23.7(4.1)	
End of season	92	25.5(5.9)	61.4
Average Prices	100	22.1(4.1)	
Wood	100	343.8(21.3)	
Red Brick			
Beginning of season	100	93.7(6.4)	
Middle of season	100	84(4.8)	
End of season	100	75.2(9.8)	25

Average Prices	84.1(4.5)

Change ratio of input prices was higher than output prices. At start of season brick prices were high and at the end of season prices of dung increase. It becomes costly to produce more and more with time.

Table 3
Fuel profile (Abdalla et al, 2012).

Item	Average Product range per t DM
Loose dung	2950–4660 bricks
Compacted dung	2490–4980 bricks
Wood	25710–180000 bricks

Labour, dung fuel, rent and wood fuel costs are 57%, 22%, 6% and 13% of total costs at average kiln. (Abdalla et al, 2012)

The cost benefit ratio of brick making was 1.25 SDG (Sudanese currency) for every 1 SDG invested. Income from land, per capita, averaged 13 Sudanese Pounds per day for kiln owners and 2.4 Sudanese Pound per day for farmers. (Abdalla et al, 2012).

Table 4
Cost and revenue for farms and kilns (in SDG currency) (Abdalla et al, 2012).

Parameter	Red brick Kiln Owners (n= 45)	Urban farmers (n = 15)
Average total return	147229.6	8.267.00
Average total cost	116355.3	3718
average net return	30874.3	4626
Gini coefficient	0.38	0.49
B/C	1.27	2.22
Land Share of total cost	6	29
*SDG(New Sudanese Pound)=0.4US Dollars		

Research Methodology

Following manufacturing ratios are calculated

1. Inventory Turnover = COGS/Average Inventory

   (Average Inventory= Total Production/2)

2. Revenue per employee Ratio = Total revenue / Number of employees

3. Manufacturing Cost to Total Expense Ratio = Manufacturing cost / (DM+DL+Total FOH)

   DM = Direct Material , DL = Direct Labour, FOH = Factory Overhead

4. Maintenance cost to total expense ratio

5. Current Ratio = Current Assets/Current Liability

6. Net working Capital = Current Assets-Current Liability

7. Contribution Margin = Sales – Variable costs

When CM is equal to fixed cost then profit is zero, and at that point kiln reaches BEP sales.

Unit CM Ratio = (TR-TVC)/TR

8. Net Profit

9. Net Profit Margin = Net Income/Sales
10. Payback Period = initial investment/monthly cash inflow
11. BCR = Net profit/Cost of goods sold
12. Breakeven Point Sales
13. Value added ratio (VAR) is calculated in number of times/rates.

There are 8 steps until bricks are used in a new house. Value is added separately and collectively at each step. Clay is converted to a house made of bricks.

Kiln accounts receivable model

Description: This simple linear regression model tells about Impact of credit sales Rs on Net Profit.

SPSS is used for regression.

$Y=a+ \beta_1 X_1 \pm u$

(Y= dependant variable. X1 = independent variables. β_1 = coefficients. u = error term. a= intercept)

Hypotheses Testing: If significance level is less than 0.05 H0 (Null Hypothesis) will be accepted

$H_1: \beta_1 = 0$ (Credit sales has sufficient impact on Net Profit)

Results and Discussion

Calculated manufacturing ratios are as

Table 5
Manufacturing Ratios for different sizes/types of the kilns

Ratio	Large Kiln	Medium Kiln	Small Kiln
Average Inventory	3573529	1232738	115214.3
Inventory Turnover	8.69944	9.648061	9.980643
Revenue per Employee Ratio	566198.4	456718.8	93563.64
MC to T Expanses Ratio (Average= 92.3%)	96%	91%	86%
Current Ratio	6.295111	5.93294	11.94512
Unit CM Ratio	0.450755	0.419576	0.512287
Net Profit Margin	0.295417	0.207677	0.150278
BCR Ratio	0.52	0.35	0.27
VC %	0.872609	0.83973	0.720931
FC %	0.127391	0.16027	0.279069
payback period Months	8.247809	26.86709	23.56956

Inventory Turnover: Inventory is stock of bricks that are manufactured at kilns. This ratio tells about the sales skill of the kiln management. It tells about times brick inventory is sold. Higher ratio is better. Inventory turnover ratio is 8.7, 9.6 and 10 for large, medium and small kilns respectively.

Revenue per employee Ratio: it is also called Revenue to employee ratio. It is used to compare kilns. It shows capacity of each employee to generate revenue for the kiln.

Revenue per employee ratio is 566199, 456719 and 93563 Rs for large, medium and small kilns respectively.

Manufacturing Cost to Total Expense Ratio It is important ratio. This ratio is 96%, 91% and 86% for large, medium and small kilns respectively.On the average it is 92.3% for 90 kilns.

Maintenance cost to total expense ratio is 1.4% on average for the sample of all 90 kilns. Here kiln has to make balance between high repair/maintenance cost and using more capital assets (requiring less repair/maintenance). On the average Brick kiln industry current ratio is 7. Kilns have on average 7 times more assets than liabilities. They can cover liability (annual) 7 times. Good ratio is between1.2 and 2 but here it is between 5 and 7.

Current Ratio: It is important working ratio for a kiln. It is 6.3, 5.9 and 11.9 for large, medium and small kilns respectively. On the average for industry it is 7. Kilns have on average 7 times more assets than liabilities. They can cover liability (annual) 7 times. Good ratio is between 1.2 to 2 but here it is between 5 to 7.

Net working Capital (NWC): This ratio is also about financial ability of the kiln to pay in short term or in future. NWC is 3730857, 2108725 and 2691000Rs for large, medium and small kilns respectively. These are the rupees available immediately to kiln.

Contribution Margin: CM is sales minus variable costs. When CM is equal to fixed costs then profit is zero and kiln reaches BEP sales. Unit CM ratio is 41%,45% and 51% for large, medium and small kilns respectively. For every rupee sales only 41% goes to covering FC and profit generation for large kilns. Higher the ratio better it is. It means more money available to cover FC. CM in rupees is 21987375, 7167304 and 854397 Rs of sales.

Net profit is 281808, 3647403 and 14908971 Rs for small , medium and large kilns calculated in income statement. Net profit , as percentage of gross profit, is highest for large kilns (80%). It is 50%, 68% for small and medium kilns. Net profit is less than gross profit because of operating expenses and non operating expenses. Operating Expenses (opex) is opposite of capital expenses. It is cost of normal business operations for kilns. Opex includes land cost (Rent) , maintenance cost and costs of *chokidar*, advertising, marketing, utilities, insurance, theft and legal fees. Non operating Expenses are not related directly to the main business of brick making. It includes interest, taxes, depreciation and waste cost. On the average operating expenses are 2.9 times non operating expenses.

Net Profit Margin: it is also called as return on sales. Net profit margin is 0.29, 0.21 and 0.15 for large, medium and small kilns respectively. It is actually profit that remains after subtracting all expenses (operating and non- operating). It is highest for the large kilns.

Payback Period (months): This ratio tells the amount of time that is required to pay back the initial amount that was invested at the start of the business. It is based on the current profit level. Payback period (months) is 8.3, 26.9 and 23.6 for large, medium and small kilns respectively.

BCR (Benefit Cost Ratio): It is used to compare kilns regarding their profits. BCR is 0.27, 0.35 and 0.52 for small, medium and large kilns.

Breakeven Point Sales (BEP): It is point of sales where revenue equals the costs. It helps kilns to decide for the units or bricks to produce to at least cover all costs. It is 150841 bricks (1043289Rs), 1338155 bricks (9374469 Rs) and 3839411 bricks (27279716Rs) sale for small, medium and large kilns respectively.

Value added Ratio (VAR): following table is generated,

Table 6
Value addition at different levels of brick kiln industry.
(Per 10000 Bricks, value added at each step)

S.no.	logistical partners	Cost added	Value added separately (times)	value added at each level (times)
1	Clay	1158.563	1	1
2	transport clay plus fuel	4007.579	3.61423	2.614
3	land	668.8782	4.203212	0.588982
4	Labour	152.8667	4.344935	0.141723
5	Fuel	14814.61	18.4695	14.12457
6	Kiln	23178.17	40.1128	21.6433
7	sales agent	20370.55	59.27065	19.15785
8	House	1339836	1280.526	1221.255
	house value	284084		

In the end 10000 bricks are sold 1280 times initial cost of procuring clay. Clay cost is taken as base. Highest value is added at final stage when house is sold. Labour add least value to 10000 brick house.

Kiln accounts receivable model: Results achieved are

Table 7
Kiln Accounts Receivable Model SPSS Model summary, ANOVA and coefficients

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.171[a]	0.029	0.018	7770034.4

a. Predictors: (Constant), CreditSalesRs

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1.599E+14	1	1.599E+14	2.649	.107[b]
	Residual	5.313E+15	88	6.037E+13		
	Total	5.473E+15	89			

a. Dependent Variable: NetProfit

b. Predictors: (Constant), CreditSalesRs

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	6686907.2	922618.74		7.248	0
	CreditSalesRs	0.651	0.4	0.171	1.628	0.107

a. Dependent Variable: NetProfit

Equation generated is

NetProfit= 6686907+0.171CreditSales±7770034

There is insignificant relationship between Credit sales and Net profit at a kiln at adjusted r value of 0.018.

Conclusion

There are two types of the cost fixed and variable costs. Fixed costs include rent (Land cost), Interest payment on Accounts payable/Short term debt (capital cost), FOH cost (Factory Overhead) and maintenance cost. While variable cost includes Labour Cost, Clay cost, transport cost, fuel cost (special and normal fuel) and water cost. VC is 27, 16, and 12 % of total COGS for small, medium and large kilns. Largest cost for all small and medium kilns is labour cost (36-40%) of the COGS. For large kilns it is fuel cost (39%).Second largest cost for small, medium and large kilns is FOH (17%), fuel (34%) and labour costs (36%). Least cost for small, medium and large kilns is clay (3%), water cost (0.9%) and water cost

(0.4%). Land cost, maintenance cost, transport cost and water FOH costs are insignificant variables having no impact on total brick production. Labour, fuel and clay are significant variables.

Brick kiln industry of (North) Sindh is experiencing IRS (increasing returns to scale). Yes, it is financially stable. Following statistics prove it. Production of average bricks is 230429, 2465477 and 7147059 bricks for small, medium and large kilns respectively. Inventory turnover ratio is 10, 9.6 and 8.7 for small, medium and large kilns. Revenue per employee Ratio is 93563, 456719 and 566199 rupees for small, medium and large kilns. Maintenance cost to total expense ratio is 1.4% on average for the sample of all 90 kilns. On the average brick kiln industry current ratio is 7. Net working capital is 2691000Rs, 2108725 and 3730857 for small, medium and large kilns. Unit CM ratio is 51%, 45% and 41% for small, medium and large kilns. Net profit is 281808, 3647403 and 14908971 Rs for small, medium and large kilns calculated in income statement. Owner of the kiln gets most of the profit which is 48 %, 37% and 11 % of the total kiln income for small, medium and large kilns. Net profit margin is 0.15, 0.21 and 0.29 for small, medium and large kilns. Payback period (months) is 23.6, 26.9 and 8.3 for small, medium and large kilns. BCR is 0.27, 0.35 and 0.52 for small, medium and large kilns.

Unlike banking and other financial sectors the brick industry is a labour intensive industry. Operation is heavily dependent on the working of the labour on the manufacturing field / site. Businesses here are usually family run lying between sole proprietorship and partnership. These kilns are not merchandizing or service firms but manufacturing ones. So they store their extra bricks as inventory.

Profit can increase if at kilns input and output are processed as whole lot or in batches. Clay cost decrease by 50Rs per *maund* if bought via contract not by retail. 62 kilns buy clay via contract. Kilns earn by selling bricks as whole lot or in batches because this decrease total spoilage cost.

Other than brick making kiln management earn profit by many other activities. Traditional kilns don't make blocks, pure cemented bricks, etc. Kilns with tractor trolleys rent out these if these are not busy at kiln site to other kilns or to the sales agents. They deliver bricks to the customers directly mostly due to contact / reference of the sales agent/broker of the city. Kilns engage in advance booking.

Kilns can gain profit by directly selling to consumers as they don't have to pay middleman commission to sales agents. This is opportunity for the kiln to get more profit but they need to invest into more in tractor trolleys. Thus they become less dependence on sales agents. Sales agents sell forward further into brick kiln value chain to consumers or construction agencies.

At each step or level of procurement, production, distribution and consumption there is different value of VAR (Value Added Ratio) ratios. In the end 10000 bricks are sold 1280 times initial cost of procuring clay. Clay cost is taken as base. Highest value is added at final stage when house is sold. Labour adds least value to 10000 brick house.

It is not easy to start a kiln. Kilns require initial capital / investment. Large kiln need 6108824Rupees, Medium Kiln need 3714286 and small kiln needs 246428Rupees only. It is found that on the average small kilns have operated half (6 years) as less time as large kilns (12 years) have operated.

Kiln industry is dominated by capital lenders. Mostly kiln equity percentage lies between 20-30% of the total debt equity mix. Least owned are large kilns.

All kilns sell product on credit too. 17 kilns sell on credit only less than 1% of the total sale. 70 kilns sale on credit between the range of 1-10% of total sale. Only 4 kilns sell on credit up to 34% of the total sale. Credit financing is available at kilns.

Coal is used in Punjab unlike in North Sindh as it is expensive but efficient fuel. Coal is also used in India as kiln fuel. According to them fuel cost is the largest cost of brick making i.e. around 30-35%. (Palash Patra et al., 2015) coal is not used in North Sindh. In (North) Sindh largest cost for large kilns is fuel cost (39%). Punjab has registered most of the kilns and uses zig zag technology in brick production. (North) Sindh is lacking on both fronts.

Recommendations

There should be a government tax system at each level of brick kiln value chain. There is a lot of tax potential in brick kiln industry. Currently at least 5 million bricks production by a kiln is the limit to tax. This limit should be decreased. Kilns are run without professionalism as all the inputs are either underutilized or over utilized. There is *Seth* culture at kilns. On the average operating expenses are 2.9 times non operating expenses. No any input is optimally allocated at kiln.

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