

Effect of Operation Assessment on Performance of State-Owned Sugar Firms in Kenya

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ABSTRACT

The primary goal of supply chain design is to improve service quality and interaction levels between service providers and customers. The purpose of this study was to examine the effect of operation assessment on the performance of state-owned sugar firms. The research employed a descriptive causal research design to provide a cause-and-effect relationship between the variables. The target population comprised all four operating state-owned sugar companies, namely Chemilil, Muhoroni, Sony, and Nzoia. The composition of the target population consisted of four factory managers, four finance managers, five hundred and twenty-four agricultural extension officers, four human resource managers, one hundred and eighty agricultural services personnel, and four strategy and planning managers, bringing the total target population to 720. The simple stratified purposive sampling technique was applied to obtain a sample of 325 respondents. The researcher used questionnaires for data collection. The analysis of the data was executed using descriptive and inferential statistics. Statistical Package for Social Sciences (SPSS) helped in the analysis. The data was organized and presented in tables. The hypothesis was tested at a 95% confidence level. The results indicated that operation assessment had a positive effect on the performance of selected sugar manufacturing firms in Kenya ($t = 6.666, p < 0.05$). Simple regression helped determine the strength and direction of the relationship between the study variables. The study is of importance to potential investors and managers to help in policy formulation. It will also be of importance to academia, which will beef up the study, particularly in the manufacturing sector, and encourage further investigation in the area of performance based on supply chain design. The study recommended the need for managers to use proper data management approaches and tools, ensure timely access to relevant data, and ensure quality control and assurance of field tasks at all times in order to boost operational efficiency, which leads to the realization of profits in the manufacturing enterprise, especially the sugar manufacturing sector.

Keywords: Operation Assessment, Performance, State-Owned Sugar Firms, Supply Chain Design

I. INTRODUCTION

The remarkable trend in the world economy over the past three decades has been growing global economic integration (Drysdale & Garnaut, 2020). It has exposed manufacturers to regional and global competition, especially where many players are producing similar products. The sugar industry has not been spared from the steep competition. Presently, under a liberalized industry, wholesalers buy directly from the sugar mills for distribution. These circumstances make imported sugar much cheaper than locally produced sugar, encouraging the dumping of cheap sugar into the local market. This threatens the survival of the local sugar industry, yet sugar cane farming is a source of income for over 150,000 stakeholder groups (Makina & Oundo, 2020).

The sugar firms have opted for diversification strategies (Makina & Oundo, 2020). Every production firm aims to maximize its profits by developing a competitive advantage over its rivals. Diversifying means developing a wide range of products, interests, or skills in order to minimize risks. It involves acquiring different investment alternatives to spread the risk (Melnyk et al., 2009). The other system that the Kenyan sugar industry could adopt is “supply chain” design, which involves processing and critically determining where to locate firms, distribution centers, weighbridges, bridges, and culverts (Conea, 2019 cited in Misiko et al., 2023). The supply chain is designed to control inventory; hence, inventory management models form critical aspects of supply chain design. Supply chain design is the set of policies and

controls that monitor levels of inventory and determine what levels should be maintained, when stock should be replenished, and how large orders should be.

Conventionally, inventory in manufacturing refers to items that contribute to a firm's product output (Teece & Al-Aali, 2017). The supply chain is classified into raw materials, finished goods, component parts, supplies, and work in progress. In distribution, the supply chain is classified as being moved in the system and in storage, or distribution stores. Retailers carry inventory for immediate sale. In services, inventory is the tangible goods for sale and the necessary supplies for administration (Nickels, 2018). World sourcing and the migration of value-added logistical services are certainly primary drivers, but other opportunities have come into play in recent years, making direct-to-store shipments possible. Information technology linkages between supply chain partners have allowed coordination and collaboration among supply chain segments.

Temporarily, at the front of the chain, sophisticated point-of-sale systems capture product demand patterns. The information is then fed up the chain to manufacturers and suppliers. Accurate sales-forecasting tools take the guesswork out of production and reduce the need for large inventory safety stocks. Tracking and tracing tools are available to follow orders across borders and through the hands of different supply partners. Summarily, companies no longer need inventory in warehouses because they can synchronize production and distribution with demand using information technology (Child & McGrath, 2001).

A successful production has timely deliverables that depend on the accuracy and timeliness of a vast amount of information (Janvier-James, 2012). Field officers spend more than 50% of their time in the field, where data is difficult to access away from the site office. Field operations and services experience extensive delays and rework due to information that is unavailable, inaccurate, or outdated as a result of manual processes. Delays and rework reduce the overall productivity of the firms and increase indirect costs due to schedule delays or direct costs due to work (Larson & Halldorsson, 2004).

The Kenyan sugar industry continues to exhibit a lack of competitiveness in the regional and global sugar markets, as confirmed by repeated requests for continued extension of COMESA safeguards by the government (Karanja, 2019). The government has continued to apply for and secure protection for the local sugar industry against imported sugar. This means the cost of sugar production in Kenya is still higher than the global price. This inability to compete in a free market economy has seen Muhoroni and Miwani sugar mills put under receivership (Mati & Thomas, 2019).

This is due to Kenya's inadequate adjustment to liberalization and globalization forces, which have affected the competitiveness of the sector. In the era when COMESA safety guards are about to lapse, the Kenyan sugar industry needs to do something about its cost of production to become competitive (Mati & Thomas, 2019; Wolfgang, 2020). Operation assessment is a subject well studied in Europe, America, and Japan, with results being implemented for competitiveness (Edelman & Yli-Renko, 2010). Related studies in the Indian sugar industry have focused more on diversification, according to Nagare and Kulkarni (2021), but little study has been done in Kenya.

The few related studies done in the Kenyan sugar industry have been found to focus on diversification (Makina & Oundo, 2020) and management politics. Studies on the effect of operation assessment on the performance of sugar firms are still lacking. This study seeks to fill this gap by determining the effect of operation assessment on the performance of state-owned sugar manufacturing firms in Kenya.

1.1 Objective of the Study

To investigate effect of operational assessment on performance of state owned sugar firms in Kenya.

1.2 Research hypothesis

H₀₁: There is no significant effect of operational assessment on performance of state owned sugar firms in Kenya.

II. LITERATURE REVIEW

2.1 Value Chain Theory

In today's volatile market, the supply chain has become so critical (Lee & Billington, 1992; Lambert et al., 1998). A company can reap many benefits by maximizing its capacity, working with the firm, and building and nurturing the right relationship with both customers and suppliers, including smaller stockpiles, lower costs, faster reaction times, and a



sharper focus on product development, production, and capital expenditures. The concept is not new, but rather one that evolves over time as more data is analyzed. Providing support for value chains has an effect on performance (Kano et al., 2020). Since then, the sector has been the force behind development and expansion.

This concept arose from shifting industry needs. As a result, until recently, the concept lacked a theoretical foundation; instead, studies focused on defining the field and its subfields. According to Dallas et al. (2019), they emphasized the significance of the concept as the driving force behind such large investments. The theory's main flaw is its failure to explain the measured financial output of businesses.

The importance of the study is to understand the value of tailor-made supply chains by characterizing, explaining, and forecasting cooperative and supply chain-level activities and outcomes. The study's goal was to know more about supply chain design by determining which factors are ideal, how they relate to performance, and under what conditions specific designs are required (Bacon & Spicer, 2019). The resulting decisions made here will have far-reaching consequences for the issues that the concept can solve (Teece et al., 1997).

The theory has flaws for not specifying whether we are dealing with the concept or its sub-titles. Given the increasing importance of the concept in both business and academia, we've discovered that the best management strategies are well thought out and targeted toward specific outcomes. According to Lambert et al. (1998), a value-driven, strategically placed chain is replacing the traditional, price-driven, strategically decoupled one. This shift was brought about by strategic investments and proactive management aimed at amassing and organizing the most advantageous resources possible to ensure the firm's market success.

The theory neglects possession of valuable resources and is more oriented toward the strength of a company to exploit its resources and make them fit changing needs (Teece & Al-Aali, 2013). Despite criticism, the function of value for the supply chain is linked to involvement in the generation of critical information important for capabilities inside the concept of the company that considers technological advancement, company culture, and proximity (Zahra & George, 2002). To reap all of the benefits, it is clear that new types of chains will need to be tailored to account for the numerous factors already mentioned.

2.2 Empirical Review

Risks and monetary losses can occur in today's globally dispersed supply chains. Optimized warehousing and storage are important for lowering operational costs (Zhang et al., 2018). Automation improves efficiency and lowers labor costs. Minor gains were made using automation, reducing energy costs in warehouses by applying movement sensor lights (Füchtenhans et al., 2023). "Supply chains" result in profit loss (Zhang et al., 2018). In summary, cost minimization is an operation that companies are tackling, especially in their "supply chains," importantly, saving money as companies focus on leadership (Füchtenhans et al., 2023). When consumers demand lower prices and economic growth slows, or even stops, a supply manager's focus naturally shifts to cost-cutting measures. Cost-cutting is always on the mind, translating to bottom-line savings.

Quick fixes, such as stock reduction, may help to recover the cash, whereas other solutions, such as streamlining "supply chain" processes and improving planning and forecasting tools, will take longer to bear fruit. When one part inspects goods before sending them out and another inspects the same goods upon receipt, the monetary value of the process may be estimated. (Ravelle, 2019)

Larger firms in a market's "supply chain" will require the ancillary services provided by the smaller firms; the larger firms may negotiate price breaks for the combined orders. When goods sit in a warehouse without being sold, storing them can quickly outweigh the input. If cost-cutting in the "supply chain" is an option, it must consider both the here and now and the distant future. Supply chain managers can save money by moving closer to successful cost structures in their industry if they first identify key cost drivers and compare them to industry benchmarks.

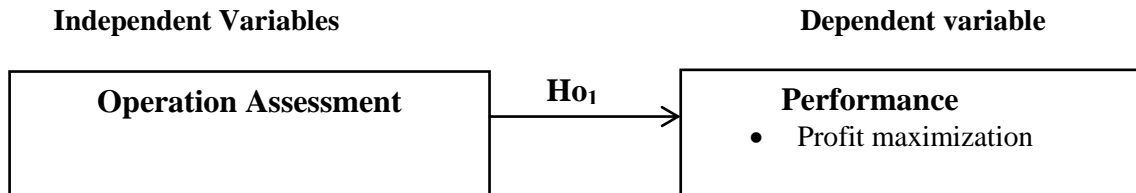
Because of the unpredictability of customer requests for customization, meeting these needs at a distant production facility may be too costly or time-consuming. According to Ravelle (2019), inefficiencies in product development can account for up to 80% of total production costs. The design of the "supply chain" influences product handling, storage, and damage. In theory, success is dependent on a harmonious balance between the business financial impact of excess inventory, earnings, and losses caused by underproduction using up-to-date forecasting methods. The Sales & Operation division is perfectly placed to monitor and improve these processes (Daskin, 2019). When the entire "supply chain" is in equilibrium with demand, "the supply chain" enters the third stage of complexity.



The Gartner model’s final two stages are “orchestrate” and "collaborative," with the latter two focusing on profit-driven optimization and total enterprise/network coordination, respectively (Janvier-James, 2011).

2.3 Conceptual Review

The framework delineates the researcher's conception and relationships pertaining to the variables under investigation. The development of the conceptual framework will be informed by a comprehensive examination of relevant literature, which will provide valuable insights into the appropriate approach to be employed.



III. METHODOLOGY

3.1 Study Area

The coverage was the four operating state-owned sugar firms of Western and Nyanza regions namely, Nzoia, Chemelil, Sony and Muhoroni Sugar companies Ltd. The geographical distribution was a fair representation of other sugar manufacturing firms due to population under study

3.2 Research Design

The research used descriptive correlation design to achieve stated objectives. The design was chosen in the study in order to describe behaviour, attitudes, opinions, values, perceptions and characteristics as accurately as possible regarding peoples perception on supply chain design approaches and the socio technical factors involved, determine the degree of existence and discover the link that exists between them (Mugenda & Mugenda, 2003). This research was designed in state owned sugar industries in order to construct a frame work for its adoption to improve on supply chain design quality.

The study used both descriptive methods of means, percentages, standard deviations and frequencies to achieve its objectives. This study brought an understanding on how operation assessment impact performance of state-owned sugar firms in Kenya.

3.3 Target Population

The research was carried out on all four selected sugar firms in Kenya (Chemelil, Muhoroni, Sony, and Nzoia) that are currently operational (the sugar industry was purposefully chosen in the study since the firms have faced a multitude of setbacks in the past to the extent of having some firms close, necessitating the study). The target population constituted all factory managers (4), finance managers (4), agriculture extension officers (524), human resource managers (4), agriculture service personnel (180), and strategy and planning managers (4), yielding a total target population of 720 from the four sugar firms.

These were a true representation of their organization, as their day-to-day duties cover all aspects of the questionnaire, and the involvement of more managers would be expensive but just yield similar responses. In their absence, their deputies were requested to fill out the questionnaire.



Table 1

Target Population

Sugar Company	Target Population	Agriculture Services Officers	Strategy Managers	Factory Managers	Finance Managers	Hr Managers	Total
Nzoia	160	50	1	1	1	1	214
Chemilil	120	30	1	1	1	1	154
Sony	120	50	1	1	1	1	174
Muhoroni	124	50	1	1	1	1	178
Total	524	180	4	4	4	4	720

3.4 Sample of the Study

Several formulas are available for calculating sample size. A probability proportion can be calculated using Fisher’s, 2003 formula for P value and use it to estimate the sample size. According to Fisher, $P = \frac{\text{row sums}! \cdot \text{Column sums}(s)!}{(n!)^2}$. Therefore, the chances of picking accessible population from the target.

$$P = 0.5346076$$

To calculate size required for estimation; a proportion of about 95% confidence interval,

$$nr = 4pq/d^2$$

where: nr= required sample size

p= probability of the population

q= 1-p

d= the level of precision.

If the proportion is not known, then $p = 0.5$ assuring maximum heterogeneity with a 50/50 split. The degree of precision (d) is acceptable margin of error.

Given the confidence level of 95%, then the margin of error is + 0.5%. Therefore,

$$nr = 4(0.534607) (1-0.5346076)/(0.05)^2 = 1.00/0.0025$$

$$nr = 400$$

Using finite correction factor with the sample representing a significant value greater than 5% of the population,

$$na = nr / 1 + (nr-1)/N$$

$$400 / (1 + 399/1719) = 324.65$$

Therefore the finite size for the study is 325 respondents.

3.5 Data Collection Instruments

It was the main data collection instrument. It consisted of self-administered questionnaires. The instrument contained basic demographic questions and items intended to assess effects of facility location, operational assessment, inventory reduction and organizational factors on production output of sugar firms. The scale to assess ‘performance’ was developed by the researcher. Questions were prepared, validated and distributed to respondents. Questionnaires are the best choice for the larger target population.

Structured questionnaires helped obtain data from respondents. It was composed of some closed ended structured items (Mugenda & Mugenda, 2003). To succeed, questionnaires were short, simple and precise with questions moving from easy to difficult ones (Kothari, 2007). Questionnaires were handy having ability to collect sufficient information needed on the study concerning adoption framework within limited time and budget.

3.6 Reliability of Research Instrument

This section covered reliability and validity of instruments. It helped determine if parameters applied on same individuals from divergent firms yielded equivalent results,(stability), if results comparing with other studies yielded same results,(equivalence) and offered set of divergent operational definitions of similar concept applied to similar individuals, using familiar data collecting technique giving highly correlated result from other factories? Or items of the measure are internally consistent? (Homogeneity). It involved acceptable levels of validity and reliability of instruments.



3.7 Data Analysis

The researcher sought to establish if the questionnaires were duly completed. Data on questionnaire was cleaned, coded, classified and summarized for analysis. The most ideal model for analysis of data was the linear regression model. Statistical Package for Social Sciences (SPSS version 20) helped analyse data. It helped correct flaws that had gone undiscovered, and improve quality of the data utilized in investigation.

Use of statistics was invoked. Descriptive statistics helped in illustrating broad data and specific characteristics of the organization (Kothari, 2014). The level, direction and significance of the relationship was determined using correlation analysis. Several regression models were fitted to data to assess the relationship between variables, and the moderating effects, and hypothesis testing in examining if the outcomes were significant or not. Results were presented in tables, figures, charts and graphs. Descriptive analysis described population and objectives. Qualitative data was analyzed basing on the objectives of the study.

The data collected was subjected to qualitative analysis. Hypotheses was tested at 95% confidence interval. Simple regression analysis helped determine the strength and direction of relationship between study variables. Linear Regression Analysis equation used was:

$$Y = \beta_0 + \beta X + \epsilon$$

Where:

Y= Performance of selected sugar firms in Kenya

X= Operation assessment

β_0 = the intercept of regression line on the y-axis when X (x-axis) = 0

β = slope of regression line

ϵ = the error term-random variation due to other unmeasured factors.

3.8 Ethical Consideration

The study observed ethics. The study considered confidentiality, privacy and informed consent of respondents. The researcher sought letters of authority for research from National Council of Research and the institution of learning. Ethical considerations required informed consent by participants agreeing to the research before it commenced and were informed of the research content. The researcher handled all details of respondents with confidentiality and, endeavored to seek permission from the respondents and explain to them how information gathered would be important in the adoption of supply chain design in state owned sugar manufacturing firms to foster development.

The researcher explained purpose and value of study. No information deemed to be confidential to the respondent was collected. The approach pegged respondents to volunteer with information without coercion.

IV. RESULTS & DISCUSSIONS

4.1 Response Rate

Out of the three hundred and twenty five (325) questionnaires administered, one hundred and eighty two (182) returned the duly completed questionnaires and as such, were considered responsive instruments forming the basis for analysis.

Table 2

Response Rate.

State Of Questionnaire	Number Of Questionnaires	Percentages
Retrieved	182	56.35
Not Retrieved	143	43.65
Total	325	100

4.2 Reliability

Reliability of the test questionnaire was undertaken as shown in the table below. Value of 0.845 was above 0.7 satisfying cronbach alpha statistical requirement.



Table 3
Reliability Test

Variable	Number of items	Cronbach Alpha	Comment
Operation assessment	7	.845	Reliable

4.3 Descriptive Statistics

4.3.1 Effect of Operation Assessment on Performance

An analysis was done on the effect of Operation Assessment on performance. The analysis focused on various areas of Operation Assessment that have effect on organizational performance.

Table 3
Operation Assessment and Performance from Respondents

Statements	Disagree % (freq.)	Agree % (freq.)	Neutral % (freq.)	Totals
There is minimization of production damages.	8.79(16)	88.46(161)	2.75(5)	100% (182)
There is minimization of packaging costs.	6.59(12)	93.41(170)	0.00	100% (182)
There is tracking of inventory of raw materials and finished goods at all times.	15.38(28)	65.38(119)	19.23(35)	100% (182)
There is strong software for tracking of raw materials and products movement.	1.10(2)	76.92(140)	21.98(40)	100% (182)
There is powerful forecasting software to take care of peaks, off peaks in shopping and transportation.	34.62(63)	54.40(99)	10.99(20)	100% (182)
There is streamlining of product and inventory management in the supply chain.	3.60(7)	79.66(145)	16.74(30)	100% (182)
There are repetitive activities in inspection of harvested materials and finished goods in warehouse.	2.10(4)	97.90(178)	0.00	100% (182)
There's cost postponement of ceasing to invest in supply chain personnel and technology.	12.64(23)	68.68(125)	18.68(34)	100% (182)
There is configuration for customization at the end of the product finish line rather than at product initiation stage.	12.64(23)	87.36(159)	0.00	100% (182)
There's design of roads, bridges, and culverts that link field facilities to manufacturing plant that aid in cost minimization.	3.60(7)	79.66(145)	16.74(31)	100% (182)

From Table 3 above, results of study indicated 161 respondents showing that there was elimination of non-value adding activities. 170 respondents agreed that there's general improvement on business practices having a direct effect on the improvement of the quality service delivery and output as agreed upon by 119 respondents.

Raw material, process and product were easily checked and improved as confirmed by 145, 178 and 125 respondents respectively. The results obtained from the findings indicated that operational assessment enabled the company improve on performance in almost all functional areas (Cristea & Cristea, 2021) shared similar views that operational management systems require constant change and adaptation to merge the constantly changing business needs.

4.3.2 Descriptive Statistics of Performance of State-Owned Sugar Firms in Kenya

Organizational performance is the organizational results as measured against intended output, or goals. It includes financial output and shareholder returns. Performance is measured as financial returns (profitability), customer satisfaction (market share), social responsibility, employee stewardship (Singh, Darwish & Potocnik, 2016). Some factors are measured by human economic factors (Scott, 2000). The organization gets effectiveness, efficiency and customer satisfaction outcomes with these resources.



Table 4
Performance of State-Owned Sugar Firms in Kenya

Organizational performance	Disagree	Agree	Neutral	Totals
	%	%	%	%
There's increased output in terms of profitability	13.2	78.4	8.4	100
There's increased customer satisfaction as measured by customer care	21.8	68.9	9.3	100
There's increased social responsibility	1.3	98.7	0.00	100
There's increased employee stewardship	12	83.4	4.6	100
There's significant cost reduction	12	83.4	4.6	100
There's increased territory optimisation	16.9	75.6	7.5	100

The results of the study revealed 78.4% of respondents agreeing to the statement that there was increased output in terms of profitability. Analysis also indicated that 68.9% of respondents agreed to the statement that there was increased customer satisfaction. There was generally an increase in social responsibility, employee stewardship and the overall reduction in cost.

4.4 Diagnostic Test

Table 5 indicates the variables of interest, the PEF value was 1.013, which indicated the absence of multicollinearity. Summarily, tolerance values was 0.989 indicating conformity to the precondition. This demonstrates that regression analysis can be performed on data.

Table 5
Multicollinearity Test

Variable	Tolerance	PEF
Operation assessment	.989	1.013

Dependent Variable; Performance of manufacturing firm

4.5 Simple Linear Regression Analysis on Operation Assessment

Simple linear regression analysis the effect of Operation Assessment on production output of selected sugar firms in Kenya.

Table 6
Simple Linear Regression Results on Operation Assessment

Model 1	R	Rsquare	Adj R Square	Std. Er Of Estim	Change Statistics				
					Rsq Change	F Change	Df1	Df2	Sig. F Change
	.602 ^a	0.375	0.367	0.567314	0.375	44.44	1	74	0
ANOVA ^a									
Model	Square Sum			Df	Square Mean		F	Sig.	
Regression	14.303			1	14.303		44.4	0.000 ^b	
Residual	23.817			74	0.322				
Total	38.119			75					
Coefficients ^a									
Model	Unstdcoeff		Std Beta Coeff	T	Sig				
	B	Std. Error							
Constant	0.735	0.407		1.806	0.075				
OA	0.737	0.111	0.602	6.666	0				

Performance of manufacturing firm

From Table 6 above, values showed significant positive relationship between operation assessment and performance of selected manufacturing firms in Kenya. Operation assessment accounted for 37.5% ($R^2 = 0.375$). The F value was more than zero, $F=44.440$, $P=.000$, hence Operation Assessment was a significant predictor on production output of selected sugar firms in Kenya. Operation assessment had linear, positive significant relationship with production output of selected sugar manufacturing firms in Kenya. ($P < 0.05$) { regression coefficient, $B=0.737$, and $t=6.666$ }.

The model presents the findings;

$$Y = \beta_0 + \beta X + \epsilon$$

Where Y= Performance of selected sugar firms in Kenya

$$\beta_0 = 0.735 \text{ (constant)}$$

$$\beta = 0.737$$

\hat{X} = Operation Assessment

$$Y = 0.735 + 0.737\hat{X} + 0.407$$

From the model, the constant had coefficient of 0.735, $P = .075$. Its implication on Operation Assessment on State-owned sugar manufacturing firms would be positive at 0.735 hence insignificant ($P > 0.05$). These results are in agreement with (Mungai, 2014) who realized that Operation Assessment had a positive significant influence on Kenyan real estate performance. Additionally, (Masiko, 2013) confirmed that operation assessment had a positive significant effect on Kenyan commercial banks and “supply chain” design. However, this finding contradicts (Were, 2016), who found operation assessment to be of insignificant influence on performance in Cement Manufacturing firms in Kenya.

V. CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusions

The primary aim of this study was to examine the impact of operation assessment on the performance of state owned sugar firms. The findings of the study indicate that there exists an insignificant positive relationship between operation assessment and the performance of state owned sugar firms in Kenya. There is need for grasping effect of operational elements of order fulfillment and the necessity to avail knowledgeable and sensitive service personnel who understand the desires of customer base auguring well in differentiating a likely similar physical complete product. An increase in redundancy of machinery and operations resulting from inventory shortages causes production loss and the associated costs. The emphasis on processes, investments and the structure but the glue that holds it all together is glossed over.

5.2 Recommendations

The study revealed gaps in management of data, data loss, time wastage in searching for information and lack of interoperability. Inadequate decision making approaches, poor planning can squeeze the operational cost upwards and influence facility management cost. There's need to use proper data management approaches and tools, ensure timely access to relevant data, ensure quality control and assurance of field tasks at all times in order to boost operational efficiency, production output and lead to realization of profits in the manufacturing enterprise, especially the sugar manufacturing sector.

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