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Lean Manufacturing and Profitability of Manufacturing Firms in Uganda

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Abstract
This study was carried out to following the new wave of lean manufacturing within manufacturing firms in Uganda. The main aim was to establish whether the lean manufacturing indeed had any influence on the level of profitability and hence business continuity and success. The unit of analysis was composed of a set of manufacturing firms in Uganda engaging in production of goods for sale within and outside the country. Two respondents were selected from each of the 80 (sample size) manufacturing firms. Data collection was carried out by means of a questionnaire which was self administered by the respondents. Correlation and regression analyses were carried out to address the main aim of the study. Findings indicated that lean manufacturing within manufacturing firms in Uganda had a positive correlation with increase in profitability levels. Additionally, the lean strategies were found to have a positive influence of up to 41.4% of the changes in levels of profitability in Uganda. With these findings, it is recommended that manufacturing firms in Uganda already practicing lean manufacturing strategies should continue doing so. Likewise, those manufacturing firms that have not yet started practicing manufacturing, they should prepare to do in order to tap the positive benefits the strategies can have as far as increase in profitability is concerned. This however should be in line with other factors that significantly impact the level of profitability in these manufacturing entities in Uganda.
Keywords: Lean manufacturing, profitability

1. Introduction

Profitability is an important aspect in business operations. Even if it is not the most important objective for existence of businesses, a business cannot continue operating if it is making losses (Smith et al, 2010). There is therefore need to assess the different factors that affect profitability in a business. In this paper, the concept of lean manufacturing is assessed to check its relationship with and influence on levels of profitability of manufacturing firms in Uganda. This paper is divided into six sections including the introduction section, theoretical review, methodology, data analysis and discussion of results, conclusion and finally the references section.

2. Theoretical review

Lean manufacturing is generally referred to as a business model or a set of business strategies that aim at continuous improvement as well as reduction in wastes. Lean manufacturing strategies focus on waste reduction, helping firms eliminate non-value adding activities related to excess time, labour, equipment, space, and Inventories in the manufacturing process (Corbett and Klassen, 2006). Such strategies enable manufacturing firms to improve quality, reduce costs, and improve service to customers (Larson and Greenwood, 2004).

Lean initiatives enable only demanded products and volumes to be produced and flow through the supply chain but not the safety stock and extra inventory associated with non-lean strategies. Reduced volumes of inventory needs to be sourced, produced, transported, packaged and handled, which also minimizes waste hence increasing profits (Jones and Hines, 1997). However, lean strategies that employ just-in-time (JIT) delivery of small lot sizes can require increased transportation, packaging, and handling which contradicts with the above statement. Thus when manufacturing firms recognize this conflict, they may find a trade-off or develop solutions that mitigate undesirable consequences (Corbett and Klassen, 2006) and (Mollenkopf, 2006).

Lean processes create value through the elimination of "waste" in manufacturing (Disney et al., 1997), including the production of goods not yet ordered, waiting time, rectification of mistakes, and excess processing, movement, transport, and stock. Lean manufacturing literature highlights the application of lean practices (Manrodt et al., 2008), integrates lean and agile operations (Mason et al., 2000 and Goldsby et al., 2006).

Unicorn Consulting Associates (UCA) finds that Lean Manufacturing is the backbone of profitable manufacturing and is critical to the success of manufacturing firms. Lean manufacturing involves identifying and removing waste from all operations; more precisely, lean manufacturing involves eliminating costs customers do

not want, do not pay for and which degrade bottom line operations. Lean Manufacturing turns waste into profit (Jones and Hines, 1997). Waste includes work in progress (WIP), waiting by a machine, delays in invoice processing, time delays and dozens of other costly non-value activities in daily operational practices when engineering designs are waiting for approval. Manufacturing firms should look for (identify) wastes in every manufacturing operation and proposes exact solutions for eliminating them hence impacting on the firm's profitability (Mollenkopf, 2006). Lean Manufacturing is a proven, tested answer to improved profit levels and the number one reason why Asian manufacturing firms have faster product turns, less manufacturing cost, greater flexibility and better profitability as compared to manufacturing firms in other places (Pete, 2010).

3. Methodology

In this study, cross-sectional research design was considered appropriate. Manufacturing firms were considered to be the unit of analysis. From the selected manufacturing firms, two respondents from each manufacturing firm were considered to form the unit of inquiry. One respondent was selected at managerial level and another at supervisory level. Out of a population of 100 manufacturing firms in Uganda, a total of 80 were selected to form the sample size using the Krejcie and Morgan (1970) sampling table. This group of respondents was selected because of their experience in running their organizations both in form of lean manufacturing as well as profitability issues.

The study was conducted using self administered questionnaires. The questionnaire was tested for reliability and validity before being issued out to respondents. Results of these tests are displayed in table 1.

Table 1: Reliability and Validity test results

Research construct	CAC	CVI
Lean management strategies	0.706	0.750
Organizational profitability	0.830	0.714

Key
CAC *– Cronbach's Alpha Coefficient*
CVI *– Content Validity Index*

4. Data analysis, results and discussion

Data analysis was carried out using the SPSS software. Before the analysis took place, a review of the response rate was conducted. Out of 160 respondents (2 respondents for each of the 80 manufacturing firms) only 158 responded successfully representing responses from 79 manufacturing companies. Percentage wise, the response rate is put at 98.75%. Focusing on the main objective of the study, a regression analysis was conducted. Results from the analysis are indicated in table 2.

Table 2: Results from Factor analysis

Constructs and question items	Factor loadings
Lean Manufacturing	
Lean manufacturing reduces operational costs in my company	0.744
High costs reduce return on capital employed	0.834
Quality products increase customer satisfaction	0.827
Lean manufacturing reduces production time	0.745
Time management increases labour productivity	0.746
Time management increases sales volume as well as profit margin	0.816
Improved service delivery increases sales volume	0.755
Lean manufacturing leads to increased profitability of the firm	0.798
Profitability	
The company profits have been growing for the last four years	0.829
The company's annual net margin is always very high	0.868
The company always transfers part of of the net profit for re-investment	0.789
The company usually meets her revenue targets	0.762
The company assets are optimally utilized	0.711
ROCE depends on the level of expenses in my company	0.785
Losses affect ROCE of my company	0.800
Company's ROCE depends on actual profits made but not estimated profits	0.781
Profitability is a result of outsourcing, risk management and lean manufacturing	0.727

Following the results of factor analysis, the correlation and regression tests were carried out to respond to the main objective of the study. Results from these are displayed in subsections below.

4.1 Correlation results

Correlation analysis was carried out to establish whether there is any relationship between lean manufacturing and profitability levels in manufacturing entities in Uganda. Results obtained from this analysis are displayed in table 3.

Table 3: Correlation Results

	Lean manufacturing	Profitability
Lean manufacturing	1	
Profitability	.649**	1

***Correlation is significant at 0.01 level ~ 2 tailed.*

Source: Primary data

The correlation results indicate that there is a very strong correlation ($r = 0.649$; $p \leq 0.01$) between lean manufacturing and profitability in manufacturing firms in Uganda. This means that improvement in lean manufacturing strategies in these manufacturing companies has a high chance of bringing about improvement in profitability levels.

4.2 Regression results

Additional to the correlation analysis is the regression analysis. The regression test was carried out to check the degree of influence of lean manufacturing onto profitability of manufacturing firms in Uganda. Specifically, the regression analysis helps to substantiate the results of correlation analysis by clearly pointing out strength and percentage of influence that lean manufacturing has on profitability of manufacturing companies in Uganda. Results from this analysis are displayed in table 4.

Table 4: Results from Regression analysis

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	**Std. Error**	**Beta**		
(Constant)	.582	.463		1.257	.212
Lean manufacturing	.831	.109	.649	7.635	.000
Dependent variable:	Profitability				
R:	0.649				
R-Square:	0.422				
Adjusted R-Square:	0.414				
F-Static:	58.291				
Sig:	0.000				

Source: Primary data

The results from regression analysis indicated that lean manufacturing has a strong influence onto profitability manufacturing firms. This is judged from the value of Beta (0.649). This influence is also reported to be statistically significant (Sig = 0.000). The results further indicate that lean manufacturing influences only up to 41.4% of the changes in profitability. This leaves out 58.3% of influence to be attributed to other factors that also have influence onto profitability of manufacturing entities in Uganda. Some of these factors could be skilled labour, political stability, availability of customers and even enabling environment to ensure that the lean manufacturing actually takes place without any interruptions.

These results support the results of previous researcher in the similar lines of thinking. Though the previous researchers (Honda and Seyed 2012; Lindeke et al. 2009; Corbett and Klassen, 2006) did not carry out research in the Ugandan setting and specifically with focus on manufacturing firms, the results indicate that the current findings are similar to previous findings. This indicates that lean manufacturing or lean strategies as they may be referred to are actually good for business success and indeed improvement in business profitability.

In the same line of thinking, Larson and Greenwood (2004) had earlier suggested that the since profitability is a mathematically derived from the difference of revenue and costs in business operations, in times of intense competition when revenue cannot be increased because of failure to increase the prices, the costs can be reduced through lean manufacturing. This view was also supported by Pete (2010). It is at this point that lean manufacturing becomes very important to improvement in business profitability. This further cements the results obtained in the research concluded studying the influence of lean manufacturing onto profitability in manufacturing entities in Uganda.

5. Conclusion

The research conducted and the results obtained indicate that manufacturing firms in Uganda are on the road to success after realizing the presence and possible utilization of lean manufacturing strategies. This indicates that these entities are likely to realize huge profits in the near future if the lean strategies are correctly implemented. It is therefore recommended for manufacturing companies to continue embracing the lean manufacturing

strategies for the current and future success. A note should also be taken on the possible evolution of the lean strategies for even a better boost in the profitability levels of the manufacturing firms.

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