Management Quality, Productivity and Profitability in Manufacturing Firms in Zambia

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Structure of Presentation

- Introduction
- Research questions/hypotheses
- Conceptual framework
- Study design
- Data collection
- Method of analysis
- Results
- Summary, conclusions + policy implications

Introduction

- Manufacturing companies in Zambia have, since 1975, never had it easy. After having to contend with the economic crises of the 1970s to the 1990s, they are now faced with:

  - severe electricity shortages;

  - escalating costs of raw materials and other supplies;

  - high interest rates;

  - competition from high-quality and relatively cheaper imported goods;

 - a demanding clientele that expect high quality manufactured products.

Introduction

- Competitive pressures & deteriorating business environment…
- Forcing many firms to continuously seek ways to innovate & improve.
- One of the ways has been the adoption of QMP
- Important to study how the adoption of QMP affect productivity & profitability in order to discern public policy implications:
  - For raising the country's total factor productivity;
  - For improving income levels for both firms & employees.
 - For raising the country's international competitiveness

Introduction

- QM is "an integrated management approach that aims to continuously improve the performance of products, processes and services to achieve and surpass customer expectations"

  - It is

    - a team activity,

    - demands a new culture,

    - emphasises and calls for discipline

      - and quality knowledge.

Quality Improvement
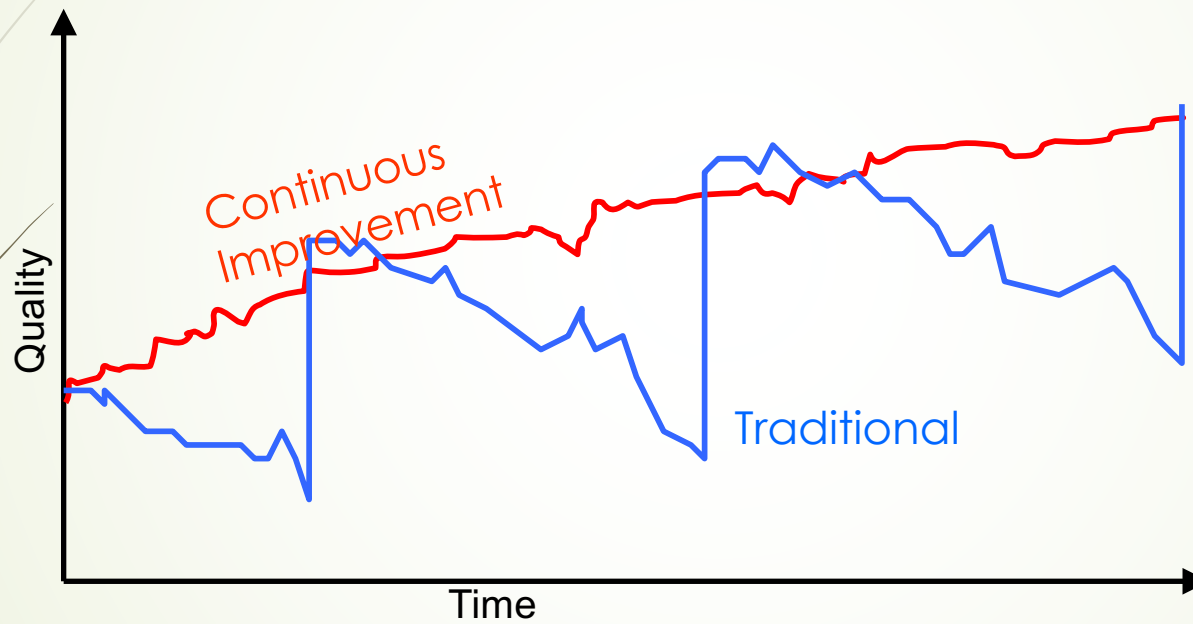
Continuous improvement philosophy

1. Kaizen: Japanese term for continuous improvement. A step-by-step improvement of business processes.

2. PDCA: *Plan-do-check-act* as defined by Deming.
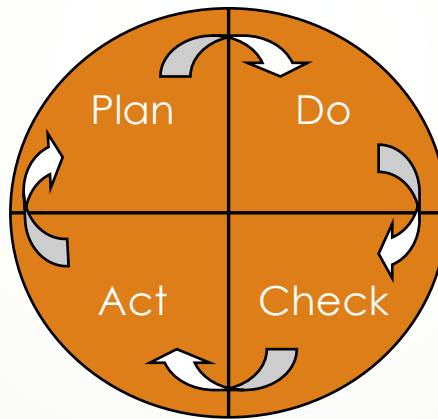
3. Benchmarking : what do top performers do?

Introduction

- QM advocates have identified several crucial principles for successful QMP which among others include:

  - leadership,

  - customer focus,

  - benchmarking,

  - people management,

  - process management and evidence based-decision making

Introduction

▶ Top leadership

▶ acts as the main driver for QM implementation

▶ creating values, goals and systems to satisfy customer expectations and to improve on organization's performance

▶ Customer focus-

▶ keeps the business aware of the changes taking place in its environment

▶ provides the knowledge needed to change the product.

Introduction

- **Benchmarking**
  - process in which an organization continuously compares and measures itself against business leaders anywhere in the world.

- **People management**-
  - recognises people as most valuable resource within an organisation,
  - ensures giving adequate training and education on prescriptions, methods, concept of quality, team skills, and problem solving

- **Processing management**
  - emphasises setting a goal of zero defects
  - requires everyone in an organization to work towards doing things right the first time, every time

Research Questions/Hypotheses

Main question:

- How do quality management practices affect productivity and profitability in the Zambian manufacturing industry?
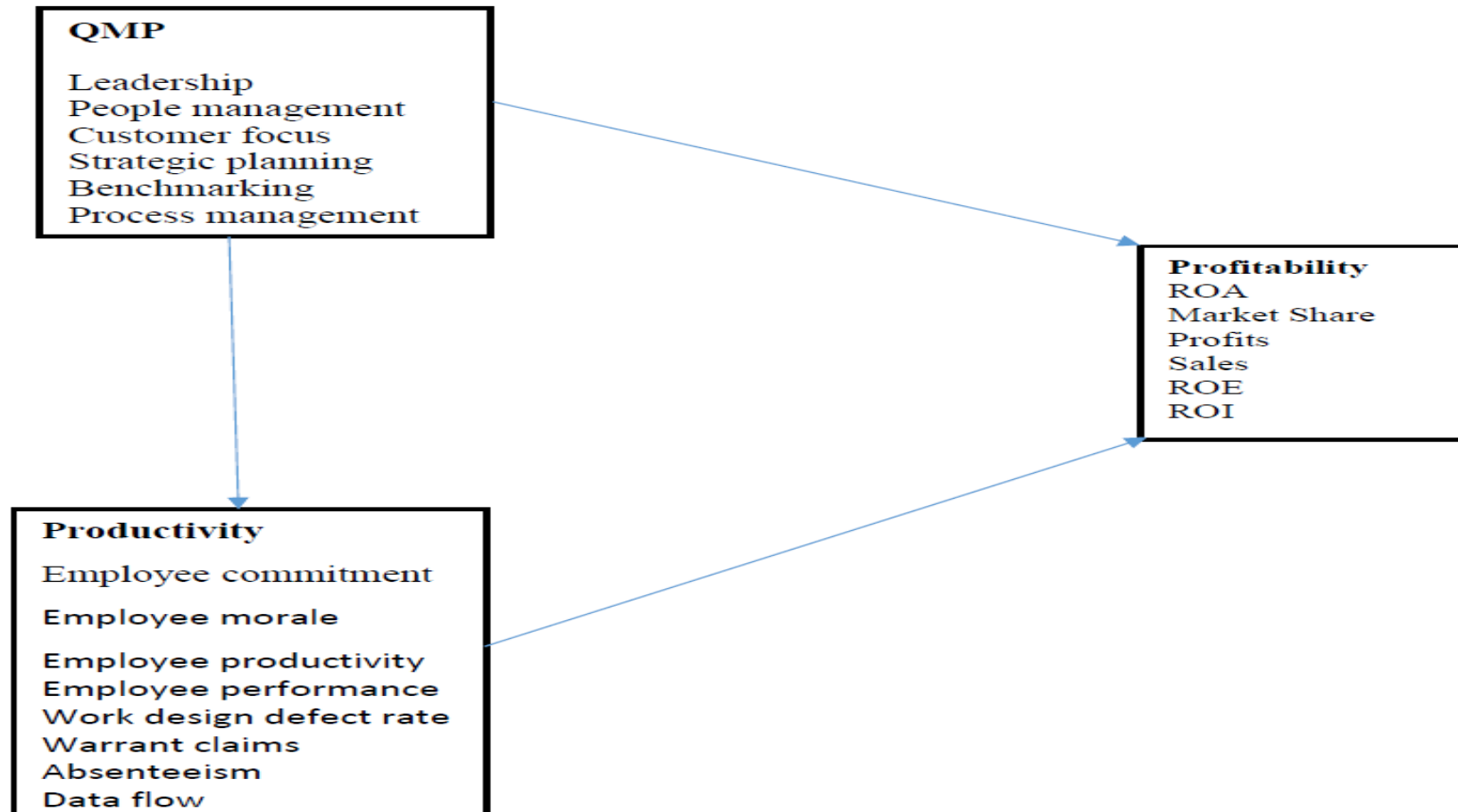
Sub-questions

- How are quality management practices related with productivity in manufacturing firms in Zambia?

- How are quality management practices related with profitability in manufacturing firms in Zambia?

- To what extent is productivity a mediator between quality management and profitability in Zambian manufacturing firms?

Research Questions/Hypotheses

➥ Building on research questions, three hypotheses tested:

➥ **Hypothesis 1**: **QMP** are **positively correlated with productivity**.

➥ **Hypothesis 2**: **QMP** are **positively correlated with profitability**.

➥ **Hypothesis 3**: **Productivity mediates the linkage** between QM and and profitability.

Conceptual framework

Figure 1-1: Conceptual Model

QMP	
Leadership	
People management	
Customer focus	
Strategic planning	
Benchmarking	
Process management	

Profitability
ROA
Market Share
Profits
Sales
ROE
ROI

Productivity

Employee commitment

Employee morale

Employee productivity
Employee performance
Work design defect rate
Warrant claims
Absenteeism
Data flow

Study design

- Cross-section survey,
- Unit of the sample at the firm level.
- Target population:
  - medium and large scale manufacturing firms
    - LSEs, SMEs more likely to adopt QMP
- N= 200 (Lusaka120, Copperbelt, 80)
  - Sample heterogeneous in terms of sub-sector
- Simple random sampling
  - sampling frame based on CSO and ZAM firm listing.
- IRB approval in Zambia

Data collection

- Measured firm management's perceptions of QMP and level of productivity and profitability in the manufacturing industry,

- Eight main QMP dimensions measured; leadership, people management, customer focus, strategic planning, benchmarking, and process management, strategic planning;

- Used survey questionnaire
    - Elements included a five-point Likert-type scale anchored from (1) strongly disagree to (5) strongly agree, which indicated respondents' disagreement or agreement with each item, respectively.

- The main questionnaire had **thirty-three QM elements** and **eleven productivity** and **six profitability elements**.

- Field work undertaken in the first quarter of 2016, January- March

Method of Analysis

- Used **Principal Components Analysis**
  - Validity and reliability procedures performed
  - PCA used to identify, extract and compute composite scores for factors underlying each construct in the study's conceptual model.
  - Composite scores used as correlation and regression factor scores.
- **Correlation and multiple linear regression** models used to assess associations and interactions between QMP, productivity and profitability.
- Mediatory role of productivity assessed using **step-wise regression and Sobel test**

Results

- Order of results presentation:
  - Sample demographics
  - Results of validity and reliability tests
  - Results of PCA
  - Results of associations (correlations)
  - Results of multiple linear regression
  - Results of mediating effect of productivity on QM and profitability linkage

Sample demographics (ii) distribution of sampled firms

Sub-Sector	Name of Province		Total
	Lusaka	**Copperbelt**	
Agro Processing, Food and beverages	39	15	54
Textile, Apparel and Leather	6	9	15
Wood and wood products	2	3	5
Paper and Paper products	4	2	6
Chemicals/ Pharmaceuticals	8	9	17
Plastics and Rubber	9	2	11
Base Metals	0	2	2
Fabricated Metal products	13	8	21
Energy, Electrical and electronics	3	6	9
Machinery and Equipment	2	6	8
Other please specify	34	18	52
Total	**120**	**80**	**200**

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Sample demographics:
(ii) firm size by employment and sub-sector

Sub-sector	Employees					Row Total
	Less than 50	51-100	101-150	151-200	Above 200	
Agro processing, food and beverages	12	15	5	4	18	**54**
Textile, Apparel and Leather	8	2	2	2	1	**15**
Wood and wood products	2	2	0	0	1	**5**
Paper and Paper products	1	2	0	2	1	**6**
Chemicals/ Pharmaceuticals	8	4	0	2	3	**17**
Plastics and Rubber	2	4	2	1	2	**11**
Base Metals	1	0	1	0	0	**2**
Fabricated Metal products	9	6	0	2	4	**21**
Energy, Electrical and electronics	4	2	1	0	2	**9**
Machinery and Equipment	7	0	1	0	0	**8**
Other please specify	23	12	3	2	12	**52**
Column Total	**77**	**49**	**15**	**15**	**44**	**200**

Validity and reliability tests

- The factorability of the 50 items in the measurement instrument was examined.

- Several well-recognised criteria for the factorability of a correlation were used.

  - Firstly, it was observed that the 50 items correlated at least .3 with at least one other item, suggesting reasonable factorability.

  - Secondly, the Kaiser-Meyer-Olkin measure of sampling adequacy was 0.89, above the commonly recommended value of 0.6.

  - Third, the Bartlett's test of sphericity was significant ($\chi2$ (528) = 2720.16, p < .05).

Validity and reliability tests

- The reliability analysis was conducted by calculating the Cronbach's alpha for each scale.

- The result showed that the Cronbach's alpha measure for the instrument exceeded the acceptance threshold point of 0.70 suggested by Nunnally (1978).

  - Alpha coefficients for the instruments' scales ranged between 0.77 and 0.81 after the alpha maximisation process were carried out.

    - The alpha coefficient for the quality management practices (QMP) scales was 0.81

    - that of the productivity scales was 0.77.

    - The alpha coefficient for profitability scales was 0.77.

- All the three Cronbach alpha coefficients were in an acceptable range.

- The overall value of Cronbach was 0.87 which was also in an acceptable range.

  - Suggests instrument used for data collection was reliable.

Principal Components Analysis Results

- Principal components analysis was conducted to identify, extract and compute composite scores for the factors underlying each construct in the study's conceptual model.

- As a result,

  - **Eight elements for QMP** were identified and extracted: **benchmarking, customer focus; people management; process management; leadership, strategic planning; knowledge of customer and information and analysis**

  - **Three for productivity** were extracted: **employee productivity; defect rate; data flow**

  - **One for profitability** was extracted**: profit**

- Composite scores for each of the remaining factors were then computed and used in correlation and multiple linear regression analysis

- PCA enabled us to transform the data from categorical to continuous

  - Thus, could safely use parametric tests.

Results of Association (correlations)

** correlation is significant P≤0.01; All t-tests are one-tailed.

	Quality Management Practices	Productivity	Profitability
1	Benchmarking	0.274**	0.371**
2	Customer Focus	0.293**	0.055
3	People Management	0.266**	0.177**
4	Process Management	0.208**	0.095
5	Leadership	0.307**	0.189**
6	Strategic Planning	0.024	0.011
7	Knowledge of Customer Needs	.105	.091
8	Information and Analysis	-0.009	0.035

Results of Association (correlations)

- The evidence suggest that benchmarking, customer focus, people management, process management and leadership appear to be of primary importance and exhibit significant impact on productivity.

  - Confirming H1

- Benchmarking, people management and leadership further exhibit significant impact on profitability .

  - Confirming H2

Results of linear multiple regressions
Results of overall regression model

Model	Dependent Variable	R	R2	Adjusted R2	Std Error (SE)	F	Sig
First Model	Productivity	0.608	0.369	0.353	0.809	22.72	0.00
Second Model	Profitability	0.453	0.205	0.193	0.898	16.82	0.00

Results of linear multiple regressions
First model: results of the relationship btn QMP + productivity (significance individual coefficients)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics
		B	Std. Error	Beta	t	Sig.	Tolerance
1	(Constant)	3.304E-16	.057		.000	1.000	
	Benchmarking	.274	.057	.274	4.797	.000	1.000
	Customer focus	.293	.057	.293	5.136	.000	1.000
	People management	.266	.057	.266	4.673	.000	1.000
	Process management	.208	.057	.208	3.654	.000	1.000
	Leadership	.307	.057	.307	5.388	.000	1.000
Dependent Variable: Productivity							

Results of linear multiple regressions
second model: results of the relationship btn QMP + profitability (significant individual coefficients)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics
		B	Std. Error	Beta	t	Sig.	Tolerance
2	(Constant)	-3.879E-18	.064		.000	1.000	
	Benchmarking	.371	.064	.371	5.830	.000	1.000
	People management	.177	.064	.177	2.775	.006	1.000
	Leadership	.189	.064	.189	2.963	.003	1.000
Dependent Variable: Profitability							

Mediatory role of productivity

Independent Variable	Mediating Variable	Beta Coefficients		
		Model 1	Model 2	Model 3
Quality Management Practices (QMP)	Productivity	0.371**	0.271**	0.303**

- Results indicate that the beta coefficient of QMP with the inclusion of productivity in Model 3 has a lower value than in Model 1.

- Since the beta coefficient in Model 3 is of lesser value (0.303) than the beta coefficient of the independent variable in Model 1 (0.371),

- This suggests that productivity has a mediating effect on the linkage between QM and profitability thus, confirming H3.

What do results mean for managers?

- In summary, we found that:
  - quality management practices lead to significant improvements in productivity and profitability,
  - The higher the level of productivity associated with implementation of quality management practices the higher the resulting profitability of a firm.
- suggesting that heightened adoption and implementation of quality management practices is a key factor that can spur the growth of manufacturing industry in a country like Zambia.
- By implication, the result also suggest that bad management practices remain a key factor holding back the growth of the sector.
- Findings provides a demonstration of the importance of QMP manufacturing industry in Zambia
  - in enhancing its productivity and profitability
  - in strengthening the international competitiveness of Zambian manufacturing.

What do results mean for managers?

- This raises the obvious question: why are these QMP not being adopted by all manufacturing firms in Zambia?

- One important factor is cost constraints.

- Many of the shortfalls with management practices in industry could be addressed through widespread basic quality management systems training but costs of training in quality management practices and systems are a limiting factor.

What do results mean for managers?

- Another factor is **informational constraints** –
  - many manufacturing firms may not be aware that the costs of quality management are more than offset by the productivity and customer loyalty and sales effects as to be profit enhancing.
- Broadly, the evidence is of particular interest to practicing managers as it **suggests what factors should be emphasised to stimulate the adoption of quality management concepts with limited resources**.

Summary and Conclusions

- Competition and deteriorating business environment drive adoption of quality management (QM) practices in manufacturing industry in Zambia.

- Quality management practices positively impact productivity and profitability in manufacturing firms in Zambia.

- Given limited resources, Zambian manufacturing firms should focus on QM practices that make the most impact on productivity and profitability.

- Based on study results, these are

  - Top leadership commitment

  - Customer focus

  - Benchmarking

  - People management

  - Process management

- The higher the level of productivity associated with implementation of quality management practices the higher the resulting profitability of a firm.

Limitations

- Cross-section data used
  - Perception-based approaches
- Ability to disentangle QMP from other firm objectives
  - Quality objective assumed at firm level
- Sample size, budget and resources
  - Commissioned study
- Replacements made on initial sample list
  - Number of manufacturing firms initially sampled have ceased operations
- Nonetheless, findings rest on a firm methodology, empirical rigour and rationale
  - Provides solid evidence base for managerial decision-making and broader policy formations

Policy implications

- The findings of the study also bear on some policy implications. These are as follows:

- **Quality management and productivity improvement can lead to sustainable job creation**

  - The productivity enhancing role of quality management practices that this study establishes resonates with the government's goal of promoting productive employment in Zambia. In this regard, Government can leverage its job creation strategy anchored on quality management and factor productivity improvements.

- **Enterprise support to achieve improved performance through quality management.**

  - The evidence that this study provides suggests that the costs of QM are more than offset by the productivity and customer loyalty and sales effects as to be ultimately profit enhancing. However, the immediate costs require to be offset by official enterprise support through appropriate tax incentives that can encourage manufacturing firms to invest in quality management systems

Policy implications

- **Basic quality management training would improve productivity**

  - Many of the shortfalls with quality management practices in Zambian manufacturing could be addressed through more widespread basic quality management training; for example, industry, government and university provision of 3-month quality management training courses.

- **Strategic Government partnership with role players in industry is necessary for accelerated quality management system uptake and practice**

  - Achieving productivity-driven growth through the application of quality management practices require that government engages with role players in industry (such as the Zambia Association of Manufactures) to make the profitability of quality management well known to its membership.

Policy implications

Institutional framework for coordination

An institutional framework (e.g., a National Productivity Institute) for coordinating quality management and productivity improvements at the country level may be helpful to catalyse broader interest in QM.

END

Thank you!!!!

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