

Full Length Research Paper

Quality management practice in Ethiopia

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Competitiveness in the global market is becoming fierce. The importance of total quality management is growing to increase customers' satisfaction and as a result to win the market in the long term. However, developing economies like Ethiopia is challenged in their quality of products and services. Based on the Ethiopian Quality Award (EQA) self-assessment model and the 2009 award participants, quality management practice in Ethiopian manufacturing and service industries is studied. The result justifies that quality will be the future challenges of competitiveness. The root causes of the quality problem are investigated and revealed in the study to give directions for the policy makers, the industries and researchers.

Key words: Quality management, quality award.

INTRODUCTION

Ethiopia has registered development in the past five years. According to government's reports two digit rates of economic development have been achieved. Development, progresses, changes and mainly the efforts are clearly seen. However, relative to where the country is going to reside, its achievements are far behind. Many researches have been done to identify and explore the means towards fast and sustainable development. Now, it is understandable by most of the stakeholders that quality related problems are the stumbling block for the majority of the industries. Furthermore, quality related problems were apparent in all the sectors. There were many research conducted to alleviate the problems. Some of these are on: healthcare (Ermiyas, 2009; Shewit, 2009; Marta, 2010), education (Jelalo, 2009; Birhane, 2010), construction industry (Samson, 2008; Wondifraw, 2009; Alemnew, 2010), manufacturing industry (Haben, 2008; Netsanet, 2008; Mesafint, 2008; Birhan, 2008;

Tessema, 2008; Dagne, 2009; Yitagesu, 2009; Amanuale, 2009; Asrat, 2011; Negalign, 2011; Wondifraw, 2010) and public service (Mihret, 2008; Freselam, 2010; Rahil, 2009; Birhan, 2009; Haftom, 2010). These researches studied so far are either at organizational or sector level. Moreover, most of the research was conducted on the consecutive results and effects of quality related problems. So far there is no effort to investigate the causes of poor quality product/services.

As a response to this problem, at national level, the Government of Ethiopia has considered quality as a development infrastructure since 1940s when agricultural products export market began to expand. Efforts made to disseminate quality in the country can be classified into five periods. Pre-Ethiopian Standard Institute, Ethiopian Standards Institute, Ethiopian Authority for Standardization, Quality and Standards Authority of Ethiopia (QSAE) and post-QSAE. Moreover, international

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Table 1. Criteria and weight comparisons of the main quality awards.

The Australian Quality Award		The European Quality Award		The Malcolm Baldrige National Quality Award		The Ethiopian Quality Award (EQA)	
Leadership	17%	Leadership	10%	Leadership	9%	Leadership	15%
Information and analysis	13%	People management	9%	Information and analysis	8%		
Policy and Planning	8%	Policy and strategy	8%	Strategic quality planning	6%	Policy and strategy	8%
People	20%	Resources	9%	Human resources development	15%	Resource management	12%
Quality of process, products and service	22%	Processes	14%	Management of process quality	14%	Processes	15%
Customer focus	20%	People satisfaction	9%	Quality and operational results	18%	Customer focus	25%
		Customer satisfaction	20%	Customer focus and satisfaction	30%		
		Impact on the society	6%			Impact on society	10%
		Business results	15%			Business performance	15%

partners such as United Nations Industrial Development Organization (UNIDO), engineering capacity building program (ecbp) and the Japan International Cooperation Agency (JICA) played measureable roles. Despite the efforts made, the deployment of the quality concept in practice is questionable.

This research aims at diagnosing quality management practice in Ethiopia in general to identify the root causes of quality problems in Ethiopia. The outcome will also benefit the government to device a policy and/or a program for further improvement of quality in the country's product/service.

Research approach

The authors of this paper were leader and member of the Ethiopian Quality Award (EQA) technical team which prepared the self-assessment manual, evaluated the participants' document and proposed award winners to the jury. In due course, the data for this research was acquired. Background to the EQA and its manual, evaluation process and evaluators are briefly

described to verify the accuracy of the data and at the same time, the reliability of the research outcomes.

A quality award is designed to support in the development of organizational excellence and to recognize organizations for their achievements in quality and performance. It is also aimed at raising awareness about the importance of quality and performance excellence as a global competitive edge. Recognizing the need for implementation and integration of quality concepts in the operations of Ethiopian manufacturing and service industries, the Addis Ababa University (AAU) and Walta Information Center (WIC) had initiated the EQA in 2007.

Then after, EQA has developed a self-assessment manual which is carefully designed to accommodate total quality management tenets. The manual is also in parallel with major quality awards such as: Deming Prize (1951) in Japan and the Malcolm Baldrige National Quality Award (1987) in USA. The European Foundation for Quality Management (EFQM) (1988), the Australian Quality Award (1993) and developing countries models are also reviewed. Furthermore, ISO 9000:2000 Quality Management System is used

as an input (EQA, 2009).

Since all quality award models are derived from the tenets of quality management, they look alike. However, they have some differences in their focus area and weight of criteria. Table 1 compares criteria weight of main quality awards. Customer focus and policy and strategy have been given the highest and the lowest weight in all the awards respectively. Very recent researches are focused on: Effective implementation of quality in organizations (Yasin et al., 2011; Srivastav, 2011), the importance of quality concepts (Parast et al, 2011), uses and applications of quality tools and techniques (Parajapati, 2011; Ghosh and Roy, 2011) etc. Root cause analysis has not got attention in the quality improvement effort at national level.

The EQA model's main criteria used to evaluate industries were leadership, policy and strategy, resources management, process management, customer satisfaction, business performance and impact on the society (Figure 1). Under these seven criteria, there are 28 sub-criteria, 65 sub-sub criteria and 361 questions. Overall weight of EQA is 1000 points which is divided into Leadership—150 points, policy and strategy—80 points

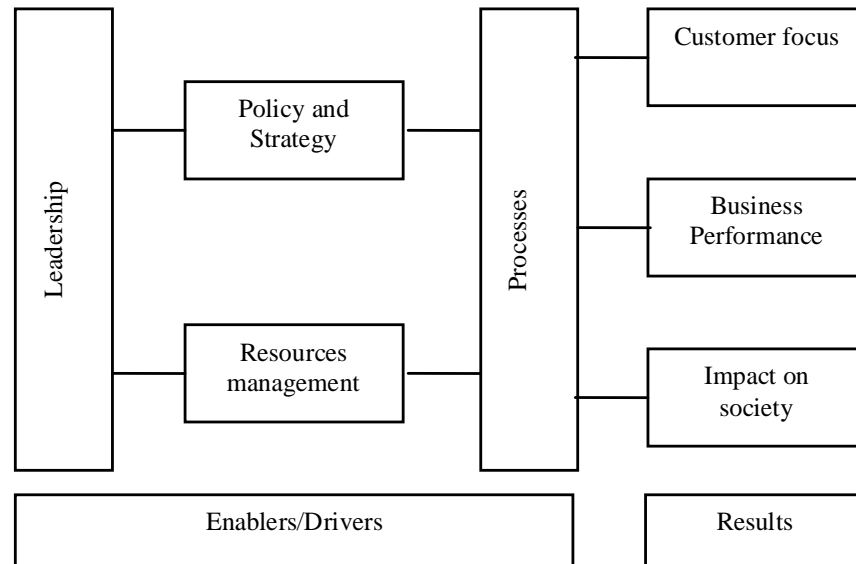


Figure 1. Ethiopian Quality Award.

resources management—120 points, process management—150 points, business performance—150 points, customer focus—250 points and impact on society—100points. Furthermore, sub-criteria weights are shown in Table 2. The weight of sub-sub-criteria and questions' scoring system is well-defined and the examiners will conduct a consensus process to agree on a percentage band within which scores will be given in each category in the application.

The evaluation process of the EQA starts from application and ends in award winners' selection. It has eight stages. These are: (1) application, (2) self-assessment, (3) submission of self-assessment report, (4) independent and subsequent consensus review by the technical committee, (5) Short-listing, (6) second registration, (7) site visit review, (8) recommendation by technical committee (9) recommendation by judges', and (10) EQA board approve.

Since the self-assessment manual is filled by a team which includes top management of the organizations, the data are reliable. Even if there are unreliable data, they were verified in the site-visit stage of the evaluation process.

The technical team is organized from different departments of Addis Ababa University. Every organization is first evaluated individually and there was a consensus review to avoid any bias in evaluation, making the data reliable for analysis.

Therefore, since the EQA manual is carefully designed to accommodate different type of industries and it is a way to diagnoses total quality of an organization, it is possible to conclude that EQA model represent all concepts of quality management. It can also review quality management performances of any organization.

This study is undertaken by taking the first EQA participants.

Data and its analysis

In the first Ethiopian Quality Award program, which was conducted in 2009, there were 43 participants. According to Ethiopian Quality Award classification of industries, 18 were from manufacturing and process industry category, 20 from service for profit-making category, three from construction industry category, and two from service (not-for-profit) category. Participants' specific industrial classification is shown in Table 3.

The organizations' data were fed into the SPSS soft-ware for analyses. Preliminary analysis indicated that Code-SMG-036 and Code SMG-037 are outliers because they did not properly follow the self-assessment manual in accordance with the instruction. Thus, the two organizations coded SMG-036 and SMG-037 were excluded from further analysis.

Similarly, Code SMG-013 was rejected from further analysis, as it was a new organization whose performance results being of a short term nature would be difficult to judge. In addition, the self-assessment report was not supported by evidence as it is proved in the site visit.

Hence, three organizations were rejected and 40 organizations were used for statistical analyses. According to the EQA model the analyses were conducted at overall result, criteria and sub-criteria level. In all the cases, after actual data analyses, transformed data analyses followed. Furthermore, quality management practices in the manufacturing industries and service industries will be separately analyzed to reveal their unique characteristics.

RESULT AND DISCUSSION

Overall result level

Using SPSS software, EQA self-assessment overall

Table 2. EQA criteria and sub-criteria weights.

No.	EQA criteria and sub-criteria	Weight
1	Leadership	150
1.1	Commitment to excellence and continuous improvement	23
1.2	Development and deployment of policies and strategies	21
1.3	Allocation of appropriate resources	21
1.4	Motivation and recognition of employee's effort	21
1.5	Customer relationship management	23
1.6	Leader's involvement in achieving organizational objectives	23
1.7	Public responsibility	18
2	Policy and strategy	80
2.1	Relevant policy and procedures	35
2.2	Sound and focused strategy	25
2.3	Deployment of policies and strategies	20
3	Resource management	120
3.1	Targeted human resources management	30
3.2	Optimized material resource management	20
3.3	Effective financial resources management	25
3.4	Efficient facilities management	25
3.5	Knowledge-based information management	20
4	Processes management	150
4.1	Optimized product/service processes	35
4.2	Synergic supporting processes	30
4.3	Processes planning and control	30
4.4	Integrated business processes	30
4.5	Review and improvement of processes	25
5	Customer satisfaction/focus	250
5.1	Exceeding internal customers' satisfaction	90
5.2	Meeting internal customers' satisfaction	80
5.3	Review and evaluation of customer satisfaction	30
5.4	Level of product/service comparative value	50
6	Business performance	150
6.1	Degree of financial performance	60
6.2	High market share	30
6.3	Increased productivity	60
7	Impact on society	100
7.1	Significant socio-economic impact	60
7.2	Enhanced environmental impact	40

results were analyzed based on the actual quantitative value and then the transformed qualitative grades.

The minimum and maximum results were 322 and 882, respectively. The range is very high, which explains uncertainty in the industries' quality practice. Again, the mean is 642. Based on 1000 points, it explains the performance is about 65% regarding quality. Both the skewness and kurtosis are negative which also indicates weak quality management practices.

The range and mean of manufacturing industry are better than service industries that show relative stability of the former sector in its practice. On the contrary, the manufacturing industries have negative skewness and

the service industries show positive skewness. But, since the service sector mean is lower than that of the manufacturing industries it does not reflect good quality management practices in the service sector (Table 4).

EQA quantitative values were changed into qualitative grades. The evaluation scale was divided into six categories: Above 90 — excellent; 83—89.9 — very good; 75—82.9 — above average; 60—74.9 — average; 50—59.9 — below average, and below 49.9 — is considered as poor. For the purpose of analysis, these qualitative values are again changed into quantitative values. Excellent is labeled as — 1; very good as— 2; above average — 3; average — 4; below average — 5

Table 3. List of EQA participants by sector.

Sectors	No.	Sectors	No.
Basic metal	2	Healthcare	2
Fabricated metal products	2	TVET	3
Motor vehicles and trailers	2	University and Colleges	2
Mining	1	Construction Consulting	2
Building materials	1	Hotels	1
Paint manufacture	3	Insurance	1
Beverage processing	2	Transport	3
Food processing	2	Construction	3
Agriculture, farming, poultry	1	Real estate	2
Pulp and paper	1	Environment	1
Plastics	1	ICT	2
Public service	1	Trading	2

Table 4. Descriptive statistics of the overall result.

	N	Range	Minimum	Maximum	Mean	Variance	Skewness	Kurtosis
Total Mark	40	560.42	321.58	882.00	641.52	17314.87	-.329	-.314
Manufacturing Industry	18	430.00	452.00	882.00	701.79	10897.00	-.654	.757
Service Industry	22	545.92	321.58	867.50	592.21	17674.14	.081	-.072

Table 5. Descriptive statistics of the overall result.

	Overall	Manufacturing industry	Service industry
N	40	18	22
Mean	4.3	3.9	4.6
Median	4.0	4.0	5.0
Mode	4.0	4.0	4.0
Std. Deviation	1.1	1.0	1.1
Variance	1.2	1.0	1.1
Skewness	-.3	-.3	-.5
Std. Error of Skewness	.4	.5	.5
Kurtosis	.1	.8	.4
Std. Error of Kurtosis	.7	1.0	1.0
Range	4.0	4.0	4.0
Minimum	2.0	2.0	2.0
Maximum	6.0	6.0	6.0

and poor is labeled as — 6.

From the descriptive statistics, the mode is average, the median is average, and the mean is also in the range of average scale. Exceptionally, the mean and median of the service industry is lower than those of the manufacturing industries. This explains that service industry's performance is below average. Skewness of overall result, manufacturing industry and service industry are all negative. Kurtosis is positive for all (Table 5). There is no organization which scores excellent. Three organizations are in the very good range, one from service industry and the other two from manufacturing industry (Figure 2).

One way analysis of variance (ANOVA) is used to analyze mean variance of manufacturing and service industry. First box plot is drawn and then the analysis proceeds. The result shows significant difference between the two groups.

Criteria level

EQA's seven criteria, i.e. leadership, policy and strategy, resources management, process management, customer focus, business performance, and impact on the society

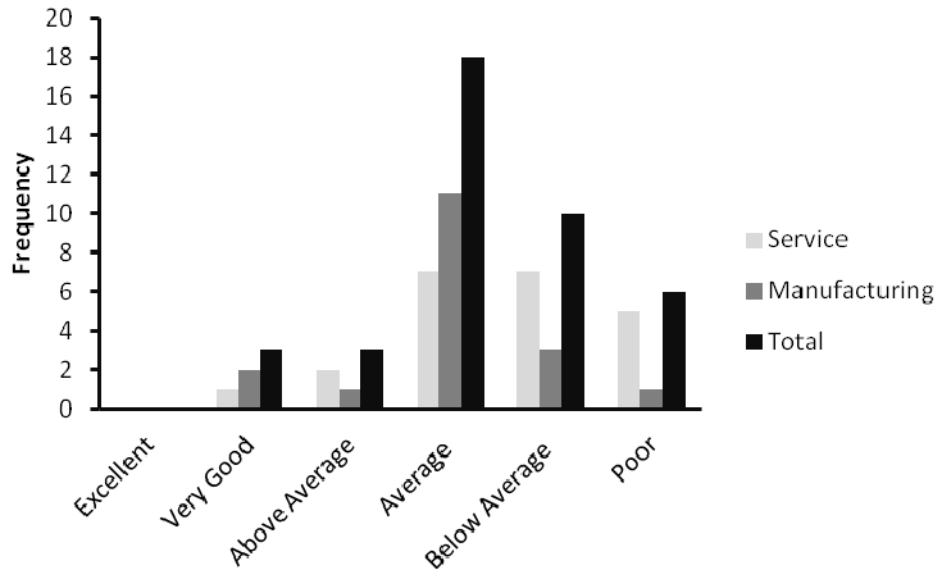


Figure 2. EQA overall score.

are analyzed and the descriptive statistics is shown in Table 6.

The ranges of all criteria results are very high, which shows uncertainties of quality management practices. The mean of all criteria is less than 70% of their weight. Business performance and impact on the society are the least in their mean. Similar to the overall performance of the EQA, all the criteria are also negatively skewed. What is unique in the analysis is that, policy and strategy is the highest in its negative skewness, which depicts the problem of policy and strategy.

The ranges of manufacturing industries are smaller than those of the service industries in all the criteria. Similarly, the standard deviations of the manufacturing industry are lesser than those of the service industry in all criteria except on impact of the society which is approximately equal.

The mean of the manufacturing industry is greater than that of the service industry in all the criteria. This shows relative stability and awareness of quality management in the manufacturing industry.

Similar to the overall result, all criteria in the manufacturing industry as well as in the service industries have negative skewness. But resources management, customer satisfaction and business performance from manufacturing industry and policy and strategy from service industries are significantly skewed.

The analysis clearly indicates that all the industries have poor performances in all EQA criteria. Similarly, to the overall result, manufacturing industry has a relatively higher performance in all quality criteria

In the overall variance analysis above manufacturing industry's mean is significantly different from that of the service industry. Similarly, every criterion is analyzed

independently and resources management, processes management and customers' satisfaction of the manufacturing and service industries are significantly different. By implication, the other four criteria showed similar mean.

Since criteria of EQA have been weighted differently, it is difficult to compare their results. In order to conduct comparative analysis, all the criteria's results are transformed into the same scale to ensure normalization. EQA total weight is 1000 marks. When it is divided by seven criteria each criterion will have about 143 marks. All results are transformed into this scale and statistical analysis has been conducted. Business performance and impact on society becomes the category with the least mean. In addition, process management's mean is also among the least in the service industry particularly. The mean in manufacturing industry is better than that in the service industry (Figure 3).

The analysis in all the criteria shows the performance of Ethiopian industries is low, and more so is that of the service industries performance is below average in all the criteria. Furthermore, policy and strategy is the least visible in the practiced criteria. This indicates that policy and strategy is the most problematic area among all the criteria. The EQA manual gives light weight for policy and strategy. According to Deming, consistency of purpose in policy and strategy is the first principle where quality starts and it is there where Ethiopian industries are found lacking.

Sub-criteria level

The overall result shows poor practices of quality

Table 6. Descriptive statistics of criteria level.

	Overall					Manufacturing Industry				Service Industry			
	Weight	Range	Mean	Std. Deviation	Skewness	Range	Mean	Std. Deviation	Skewness	Range	Mean	Std. Deviation	Skewness
Leadership	150	102.32	103.05	22.42	-.77	59.85	109.55	14.81	.59	90.84	97.74	26.28	-.57
Policy and Strategy	80	73.00	54.77	13.73	-1.70	33.80	57.78	9.78	-.14	71.30	52.30	16.07	-1.71
Resource Management	120	64.45	83.86	17.71	-.27	63.00	94.03	15.45	-1.29	56.45	75.54	15.10	.11
Process Management	150	110.13	94.56	29.41	-.647	67.02	110.00	17.97	-.83	108.13	81.93	31.19	-.07
Customer Satisfaction	250	139.88	164.55	38.25	-.590	139.06	179.72	31.68	-1.32	135.88	152.14	39.32	-.15
Business Performance	150	116.39	84.81	26.99	-.733	112.39	88.60	25.17	-1.28	116.39	81.70	28.59	-.42
Impact on Society	100	73.43	57.72	16.64	-.426	60.34	62.21	16.45	-.22	60.43	54.03	16.24	-.72

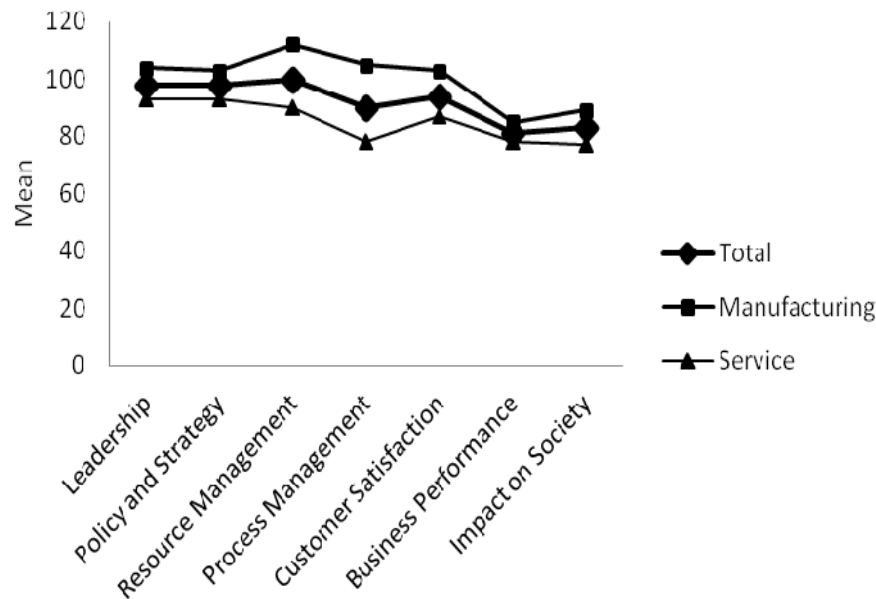


Figure 3. Mean of transformed criteria.

management in Ethiopian industries. In addition, in the criteria analysis, the problem is associated

with all the criteria. At the sub-criteria level the root causes for the problem are clearly identified.

In fact, almost all the sub-criteria are negatively skewed which practically shows weak quality

management practices in Ethiopian industries. However, the most critical problems for both the manufacturing and service industries are discriminated as follows and summarized in a fish-bone diagram at the end.

Under leadership, there are seven sub-criteria. Among these development and deployment of policies and strategies, and customer relationship management are exceptionally skewed negatively (Table 7).

Under policy and strategy, there are three sub-criteria. All of them are significantly skewed negatively. However, the weakness of the manufacturing industry and the service industry are a little bit different. Manufacturing industries have relevant policy and procedures there problems are lack of sound and focused strategy, and deployment of policy and strategy. While the service industries are devoid of relevant policy and procedures. Under such circumstances in the case of the service industries, it is impossible to deal with sound and focused strategy and deployment of policy and strategies.

Under resources management, there are five sub-criteria. Targeted human resources management and efficient facilities management are significantly negatively skewed. Facilities management is not as such a problem in the service industry as it is in the manufacturing industry.

Under process management, there are five sub-criteria. Optimized product/service process is the only criterion that is common problem of both manufacturing and service industries. However, it is more serious in the manufacturing industry than in the service industry. Processes planning and control and integrated business processes are also negatively skewed sub-criteria in both the manufacturing and service industries. Synergic supporting processes are a problem related to the manufacturing industry.

Under customer satisfaction criteria there are four sub-criteria. The first two sub-criteria, namely, exceeding internal customers' and meeting internal customers' satisfaction are significantly negatively skewed in all industries. In the manufacturing industry, however, the skewness is more amplified. In the service industry meeting internal customers' satisfaction is the most skewed sub-criteria.

Under Business performance, there are three sub-criteria. Degree of financial performance is negatively skewed in both the manufacturing and service industry.

Under impact on society, there are two sub-criteria, namely, significant socio-economic impact and enhanced environmental impact. They are both negatively skewed in manufacturing and service industries. In the service industry in particular socio-economic impact is highly skewed.

As explained previously, every criterion, sub-criterion and question has its own weight in the Ethiopian Quality Award evaluation process. So far, actual data with different weights have been used for analysis but without equal weights it is difficult to carry out comparative analyses. In order to avoid this problem and extract

maximum information out of the actual data, all the sub-criteria have to be changed into one scale. That means similar weight is given for all the sub-criteria and all the scores of the organization is transformed into one scale as has been attempted above at the criteria level analyses.

Comparative analyses are conducted by skewness, mean and standard deviations of the sub-criteria. Those sub-criteria that have higher skewness and lesser mean with minimum standard deviation are listed out and cross checked from the above results. In this way, the root cause of quality problems in the Ethiopian industries is identified and represented by a fish-bone diagram (Figure 4).

Conclusion

Through analyses of the EQA self-assessment report evaluation, generally, quality management practices in Ethiopia was found to be low in all the tenets including leadership, policy and strategy, resources management, process management, customer satisfaction, business performance and impact on society. Among these factors, policy and strategy is the most critical problem area despite the least weight given by the EQA. Comparatively, the service industries quality management practice is weaker than that of the manufacturing industries as measured by all the quality parameters. Therefore, the quality promoters, particularly the government should give special attention to the service industries quality. However, both manufacturing and service industries should be supported to laydown their day-to-day activity on a long term strategy and also to improve the root causes for the poor quality management practice.

It is necessary to propose intervention points for the consideration of the industries. There are a number of literatures that advise about the means and mechanism for improvement. Often the literatures lack clarity and consistency on the measures to be implemented at the shop floor level. Sometimes, the literature mixes-up the cause and effect, thereby making it difficult to decide on the measures to be implemented. For example, in all quality awards including that of EQA both the causes and the effects of quality improvement efforts are evaluated. But, when an organization needs to improve its performance, the starting point of the analysis and intervention should be only on the side of the causes. In the EQA manual, the causes are leadership, policy and strategy, resources management and processes management. Leadership is intertwined with all the other causes and hence it is difficult to consider it independently. Therefore, the research proposes to consider policy and strategy, resources management and processes management within the industries.

As a whole future research should be conducted in the

Table 7. Descriptive Statistics — sub-criteria.

	All			Manufacturing			Service		
	Std. Deviation	Skewness	Kurtosis	Std. Deviation	Skewness	Kurtosis	Std. Deviation	Skewness	Kurtosis
Commitment to excellence and continuous improvement	3.25	-0.41	-0.08	2.34	0.14	-0.61	3.73	-0.16	-0.62
Development & deployment of policies & strategies	4.48	-1.88	4.38	1.95	-0.21	-1.42	5.28	-1.35	1.91
Allocation of appropriate resources	4.59	-0.3	-0.52	3.93	-0.52	-0.05	4.94	-0.02	-0.59
Motivation and recognition of employee's effort	4	-0.57	1.16	3.34	0.19	0.4	4.55	-0.86	1.36
Customer relationship management	5.58	-1.11	0.73	3.13	-0.04	-0.63	6.9	-0.76	-0.71
Leader's involvement in achieving organ. Objectives	5.14	-0.87	0.97	4.38	-0.13	-1.29	5.76	-1.06	1.21
Public responsibility	3.73	-0.45	-0.53	3.22	-0.29	-0.98	4.01	-0.36	-0.73
Relevant policy and procedures	6.62	-1.06	3.55	5	0.6	-0.14	7.81	-1.44	3.78
Sound and focused strategy	5.22	-1.21	1.78	3.89	-1.35	2.07	5.93	-0.93	1.1
Deployment of policies and strategies	4.67	-0.97	0.43	3.63	-1.35	1.9	4.93	-0.71	-0.06
Targeted human resources management	5.87	-1.53	3.9	4.31	-1.1	0.43	6.41	-1.51	3.86
Optimized material resource management	3.09	-0.81	0.41	1.79	0.1	-1.42	3.11	-0.54	-0.4
Effective financial resources management	5.37	0.14	0.99	5.55	-0.13	2.78	4.37	-0.26	-0.78
Efficient facilities management	6.12	-1.33	1.5	5.61	-3.14	10.91	5.72	-0.79	0.76
Knowledge - based information management	5.51	-0.72	-0.4	5.45	-0.91	0.47	5.58	-0.64	-0.75
Optimized product/service processes	8.02	-1.25	1.48	7.48	-2.21	6.14	8.43	-0.78	0.34
Synergic supporting processes	6.98	-0.42	-0.92	5.22	-0.94	1.5	6.77	0.02	-1.37
Processes planning and control	7.5	-0.97	0.43	3.75	0.15	-1.02	8.09	-0.45	-0.73
Integrated business processes	6.29	-0.94	0.69	4.59	-0.63	-0.37	6.76	-0.76	0.08
Review and improvement of processes	6.93	-0.64	-0.24	5.04	-0.65	-0.21	7.15	-0.34	-0.67
Exceeding internal customers' satisfaction	19.74	-0.99	0.53	17.72	-1.89	5.8	20.12	-0.6	-0.61
Meeting internal customers' satisfaction	15.81	-1.41	2	14.41	-2.74	9.32	14.71	-1.32	1.76
Review and evaluation of customer satisfaction	7.17	-0.1	-1.04	5.69	0.01	-1.17	8.2	0.06	-1.31
Level of product/service comparative value	8.22	0.07	-1.1	7.94	0.06	-1.17	8.61	0.1	-1.05
Degree of financial performance	15.06	-0.99	0.8	14.76	-1.12	1.45	15.24	-1.08	1.01
High market share	9.72	0.57	2.09	10.15	1.08	4.11	8.74	-0.15	-1.26
Increased productivity	11.76	-0.38	0.07	9.38	-0.02	-0.37	12.9	-0.21	-0.19
Significant socio - economic impact	12.38	-0.6	0.32	10.14	-0.1	-0.39	13.14	-0.59	-0.1
Enhanced environmental impact	7.64	-0.34	-0.51	8.11	-0.43	-1.25	7.43	-0.28	0.5

field of quality management in Ethiopia to increase effectiveness and efficiency of the industries and make them more competitive in international

markets. Specifically, research endeavors should concentrate on quality improvement in the service industries and in the sector of public

administration. Identification and the knowledge of customers' expectation are the starting points for embarking upon quality improvements.

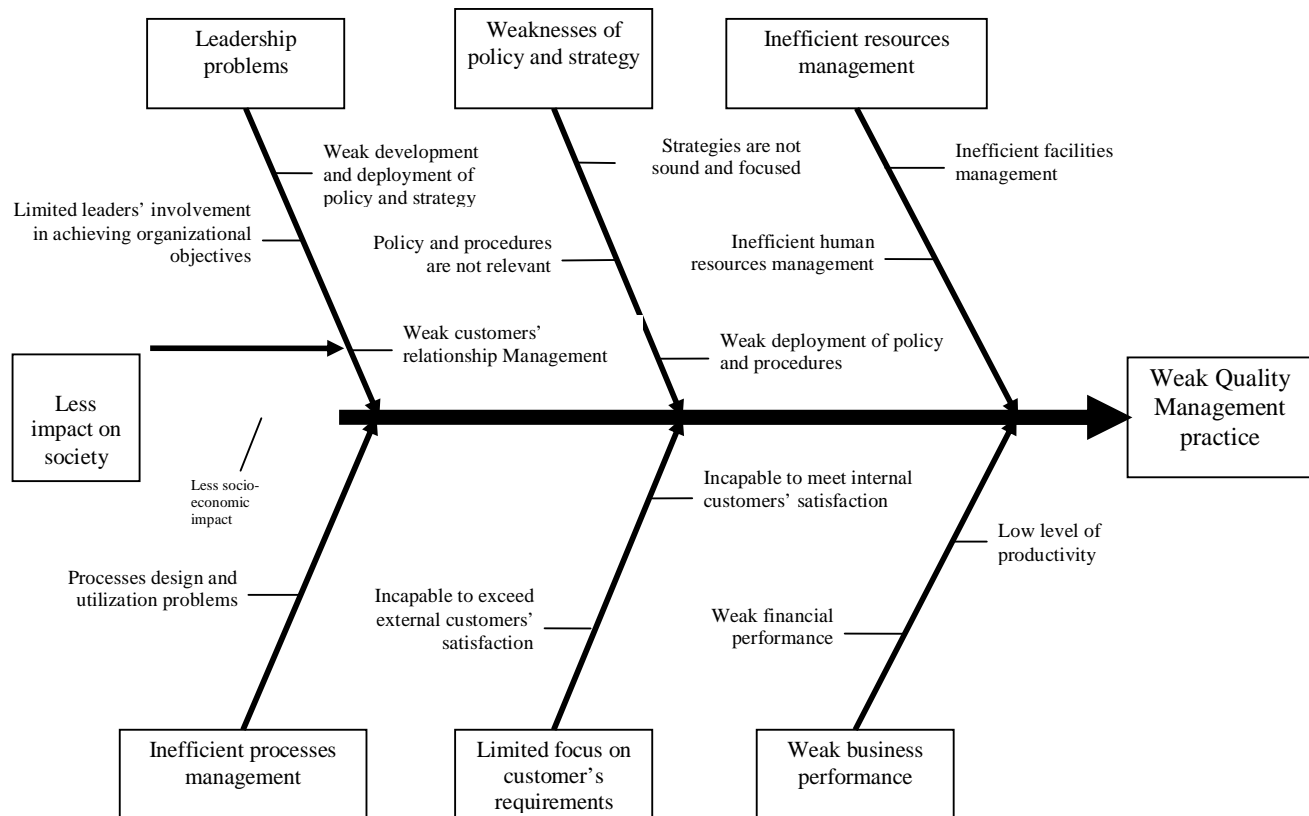


Figure 4. Root causes of quality problems in Ethiopian industries

Researchers could study the consumers' behavior so that industries could align their products and processes to customer needs and requirements.

Conflict of Interests

The authors have not declared any conflict of interests.

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