

**Mapping of Costs of Quality (CoQ) for Enhancing
Competitiveness of Local Products to Global Market:
Evidence from Manufacturing Industry in Yogyakarta Region,
Indonesia**

Heribertus Andre Purwanugraha
Universitas Atma Jaya Yogyakarta
andreasnugraha@gmail.com

— *Review of* —
**Integrative
Business &
Economics**
— *Research* —

ABSTRACT

Quality is a critical success factor for achieving competitive advantage in today's market. Any serious attempt to improve quality must take into account the costs associated with achieving quality. Quality-related costs represent a considerable proportion of a company's total costs and sales. Measuring and reporting these costs should be considered a critical issue for any manager who aims to achieve competitiveness in today's markets. The purposes of this research were to identify and analyze data concerning the practices of Small Medium Enterprises (SME's) to control Costs of Quality. Mapping the costs of quality will be benefit to management for the strategic decision making, and for decision-makers in government to provide intensive assistance program in order to improve the quality of products for accelerating quality improvement program. The data were collected from SME's throughout Yogyakarta Special Region Province, Indonesia. The research concluded that the costs of quality in all surveyed companies categorized cost of quality (CoQ) as prevention, appraisal, and failure costs. The costs of quality were allocated as prevention cost 38.79%, appraisal cost 29.93% and failure cost 24.14% (internal failure cost 15.92% and external failure cost 8.22%). The result indicated most of SME's more focus on appraisal costs than prevention costs. It proved that they are still concerning to operational activities rather than preparing the precaution of quality in the planning at the beginning process (lack of prevention in a previous stage). In a study of SME's in Yogyakarta revealed that majority all SME's spent the quality cost on controlling cost (68.72% of total quality cost) in order to decrease failure cost. It also reported that the costs of quality at 4.81 % of sales (on average).

Keywords: Quality, Costs of Quality (CoQ), Quality Cost Reporting, SME's

1. INTRODUCTION

The Local Autonomy Director General of the Ministry of State Affairs, Djohermansyah, stated that 60 percent of Indonesian products performed weak competitiveness within the ASEAN region. Meanwhile, still according to him, there were only 7 percent of Indonesian products that performed high competitiveness against Chinese products, 29 percent performed moderate

competitiveness and the rest, 55 percent, performed low competitiveness (www.gatra.com, 2012). The importance of increasing product competitiveness was also emphasised by President Susilo Bambang Yudoyono in his welcome remark in the Government Awards in Industry 2011, taking place in the State Palace, on Thursday, January 1st. He stated that local products had to be cheaper and more efficient so that they were affordable by people's purchasing power. "It does not stop there, however. We also have to keep the quality of the products (good) (www.presidenri.go.id, 2012)

Quality is, indeed, the main key of industry in Indonesia to be able to survive in the onslaught of imported goods and to penetrate the world market. Nowadays electronic appliances, clothes, foods, toys fresh vegetables and fruits are all imported. In the era of fierce competition in industry like today, product quality has been something that is highly needed to win the competition. Manufacturing products is easy to do. However, manufacturing quality products and having capability to compete with other products need extraordinary efforts, let alone in the era of globalisation and free trade where it is impossible for us to stop the influx of foreign products. One of the ways of contending against it is by increasing competitiveness of Indonesian products by offering excellent quality products.

Increasing the competitiveness of Indonesian products requires active role of all stakeholders, such as the government, business community, academicians and the public at large. The government plays an important role through its regulations that side with local products. There are numerous factors that influence the competitiveness of Indonesian manufacturing products, both external and internal ones. Other than price, quality is also a major factor that determines capability of a product to compete with its competitor. Neither does quality happen out of the blue nor comes all of a sudden. It requires considerable sacrifice, hard work and seriousness to achieve it.

Quality has been consumers' demand in the era of global competition. Their demand of quality varies, depending on their needs, purchasing power and tastes. Quality can be judged both objectively and subjectively. It is objective if compared to other similar products and it is subjective if seen from customers' or consumers point of view. Quality can be defined as fitness for use, durable, complying with requirement set by companies or satisfying the hope of customers and so on. In general sense, a product or service is said to have good quality if it complies with the design or specification and satisfies or exceeds the hope of customers at a competitive price that consumers are willing to pay. It is quality judgement by subjective point of view that becomes a challenge for companies to be able to win global competition.

Unlike in developed countries, the focus on quality done by companies in developing countries, including Indonesia, is still limited. Mandal et. al. (2000) stated that level of competition hapenning in developing countries was different from that in developed countries due to strong interfere of the government through various regulations it has issued.

Quality becomes prime attention of all kinds of organisation, both profit and non profit oriented ones, manufacturing companies or services, large, medium and small scale companies.

Full attention to quality will create positive impacts on organisations through two elements, namely: impact on the decrease of production cost and revenue increase. Quality products are only generated through good organisation internal process, one of which is the application of quality management systems or programmes. The choosing of quality management systems or programmes that will be applied is influenced by level of internal needs and motivation of each organisation (Magd and Curry, 2003).

The impact on production cost occurs through the process of manufacturing products that has high degree of conformance of the existing standard and, hence, is free from damage that might occur. It means prevention of excess and inefficiency of production cost that accordingly leads to more competitive products. Quality product will have some distinctions that are able to increase customers' satisfaction about the products. It will increase the sale of the products, which also means increasing market share so that eventually it will increase revenue of the company.

Quality has become a crucial competitive dimension for a manufacturing or service company. When a company applies increase and improvement of quality programmes there will be a need of monitoring and reporting about the progress of the programmes. Management of the company needs to understand the meaning of costs of quality. Reporting and measuring performance is considerably essential for the success of the quality improvement programmes that are being executed. The basic requirement of this reporting is the measurement of costs of quality.

A system of reporting costs of quality becomes important if an organisation is serious with improvement and quality control costs. The first step in creating the system is by reporting current actual costs of quality. Detailed list of actual costs of quality for each category will be able to give two kinds of information, namely (1) showing the amount spent for each category of costs of quality and their impact on profit, (2) showing costs of quality distribution with a category that enables managers assess the relative interests of each category.

Based on the reasons described above, this research intended to identify all elements of costs of quality spent by companies in manufacturing industry in their efforts to manage quality activities in their companies. It was expected that by identifying all elements of costs of quality this research would be able to create classification and grouping that eventually would obtain a profile of costs of quality in manufacturing industry in Indonesia, particularly in Central Java and Yogyakarta Special Region Province.

The profiling of costs of quality would then become information for the management of companies in managing the costs in a strategic manner as their effort to control the entire costs the companies had to spend. In addition, the information that this costs of quality profile provide can be used as a material for the government's policy makers to provide mentoring programmes intensively to increase product quality generated by manufacturing industry in their effort to accelerate quality improvement programme as well as product innovation that can compete in such a global competition.

2. THEORYTHICAL FRAMEWORK

In the last decade, the business environment in global market reflected intense competition both in price and in product variety. Lee (2004) stated that customers all over the world had become more quality conscious. Quality has become one of the most important drives in the market today. The new wave of quality awareness has given a significant influence on how to manage a business. Business success may simply be the extent to which an organization can produce a higher-quality product or service than their competitors. In many industries, quality excellence has become a standard for doing business. Quality becomes the main key to be able to win competition and consumers' heart. It is clear that to be able to answer the challenge in the global business environment companies need to focus their attention to quality.

2.1. The Importance of Quality for Companies in Globalisation Era

Improving quality can become the key struggle of many companies. Many of them believe that quality improvement can also improve companies' finance and their position in competition. The emphasis on quality will increment their profitability in two ways: by increasing customers' demand and decreasing goods and service procurement costs (Suarjaya, 2010). In the present global competition, with product short cycle and rapid changes in technology as well as taste of consumers, companies can survive in a long run and generate profit only by generating products and providing services that perform good quality. In their efforts to achieve their goal of improving customers' satisfaction companies need good quality control. It can be done by improving the quality of their products.

Consumers' awareness of quality has brought a significant impact in organisation management. One of the main strategies that has to be done by every company in such a global competition is to improve consumers' satisfaction through the improvement of product quality they generate. It is clear that product quality is a strategic "means" to win the competition (Magd and Curry, 2003). Product quality is something inevitable, especially when a company wish to survive and develop.

In ensuring a service to improve quality and to be able to face competition, companies need to put some efforts or activities to improve their product quality. It absolutely needs an amount of cost which is not inexpensive. High competition level demands companies to generate products that have high quality, yet cheap price, hence companies need to pay serious attention to the costs of quality (Felecia, 2004). Companies need costs of quality to obtain information useful for them, such as to know the quality level that can increase their profitability within the increasing demand of consumers and in terms of cost reduction, especially in market that has extremely tight competition.

2.2. Costs of quality

When companies apply quality increase and improvement programmes, there will be a need of monitoring and reporting of the progress of the programmes. Company management needs to understand the meaning of cost of quality. Reporting and measuring performance of quality is critical for the success of quality improvement programmes that are being implemented. Basic pre

condition of reporting is measuring and analysing costs of quality. Accurate analysis of costs of quality enables companies to know sources of costs of analysis that are inefficient and, hence, companies can take a proper and suitable action to overcome them (Felecia, 2004).

Costs of quality are divided in four categories. Two categories of this division include prevention cost and appraisal cost, which are categorized as costs of control (cost of conformance). These costs are spent in effort to prevent consumers from receiving defect products. The other two categories are internal failure cost and external failure cost, which are categorized as costs of failure (cost of non-conformance). Campanella (1999) in Felecia (2004) defines Costs of quality as costs drawn from all activities that are intended to prevent, appraise and fix quality of goods and service generated by an industry. Costs of quality comprise (1) Prevention Cost, (2) Appraisal Cost, (3) Internal Failure Cost, and (4) External Failure Cost. What is meant by costs of quality does not only include costs that are spent due to quality that does not comply with the quality standard applied, but also include costs to prevent other costs that are spent due to poor quality.

2.3. Measuring and Reporting Costs of quality for Management Decision Making

In current global market competition, quality is known as one of important factors for performance of a company. One of important aspects of quality is measuring and reporting activity-related costs (Mugan and Erel, 2000). Eventually, costs of quality are reported to improve managerial planning, control and decision making. Using information on costs of quality to apply and monitor quality programme effectiveness is one of the benefits of costs of quality system. Information on costs of quality is an important input to make decision in management (Suarjaya, 2010). It is important to know the amount of costs of quality because measuring costs of quality is the key of success of the entire quality management (Hadi, 2003). Tatikonda and Tatikonda (1996) in Mugan and Erel (2000) discussed that the failure in measuring costs of quality will cause managerial decision making not optimum.

Information on costs of quality is needed to facilitate managers to control the quality of performance and input in decision making. It can be used to evaluate overall programme performance of quality improvement. It can also be used to improve diverse managerial decisions, such as in determining strategic price and analysis of new products.

The main objective of reporting costs of quality is to improve and facilitate planning, controlling and managerial decision making. The use of costs of quality information to decide programme implementation of quality improvement and to evaluate the effectiveness of the programme is only one of potential benefits of costs of quality system. Reporting and performance measuring are very important for the success of quality improvement programme that is being implemented. The basic pre condition of reporting is measuring costs of quality.

Costs of quality become an interesting study because by controlling costs of quality companies can make strategic decisions. However, calculating costs of quality of products in such a particular manner has not yet been much conducted by companies. A lot of companies have a view that collecting data and calculating costs of quality are complicated, impractical and requires a lot of

energy to analyse it (Hadi, 2003).

Some researches on costs of quality had been conducted and empirical evidence explained that by implementing quality improvement programmes companies could increase their efficiency that is reflected in the reduction of production cost. Each quality activity brings out costs of quality. Costs of quality also have an important role in improving organisation's performance (Hadi, 2003).

A result of a case study in raw material industry showed that elements of quality cost had a huge process in prevention cost (Felecia, 2004). However, it was also mentioned that that each industry had its own characteristics and costs of quality distribution varied. According to Hadi (2003), it was proven that in yarn spinning industry, cost factor lost economic and strategic opportunity. The investigation outcome of cost quality distribution in aeronautical-defence industry found that the appraisal cost absorbed the biggest portion of the total costs of quality (Mugan and Erel, 2000)

3. RESEARCH METHOD

The data used in this research includes primary data obtained from the answers of respondents collected through questionnaires and list of questions. The respondents in this research were managers, who were responsible for the quality of Small and Micro Enterprises (SME) in the Yogyakarta Special Region Province. The population of this research was manufacturing Small and Medium Enterprises in Yogyakarta. Being only 3,185.8 km² and inhabited by about 3.5 million people, Yogyakarta is greatly suitable for the development of SMEs than the development of industry-based economic activities. This condition was supported by the potential of human resources, arts centres and educational institutions in Yogyakarta.

Manufacturing SMEs were chosen as the research subject because they have the most complete process, from material procurement to finished products. Such a long process cannot be found in SMEs engaged in trade and services. Sample was determined randomly. Questionnaire respondents were managers who were in charge of quality management area of the SMEs because the survey was confined to a local area. The data were collected by using Personally Administered Questionnaires. The advantage of this method is that the researcher or research assistants can collect all the completed responses within a short period of time and can clarify any question directly at that time. Personally Administered Questionnaire also avoids any confusion on the spot. There were 88 SMEs that were inclined to participate in this research.

4. FINDING AND DISCUSSION

From the data of costs of quality in the entire micro and small enterprises that became the subject of this research, I made an analysis in two phases. Phase 1 looked at the average of costs of quality in each element (appraisal, prevention, internal and external failure) and also looked at two components of costs of quality, namely control cost and prevention cost. The average of costs of quality were also analysed on the basis of the scale of the company (large, medium, small). Phase 2

looked at the proportion of costs of quality allocation, seen both from each element and company scale. It looked at how much companies spent for costs of quality and on which element of cost companies focused on.

4.1. Average Costs of quality

From Table 1 we can see that the highest average costs of quality that the companies which became the subject of this research spent was prevention cost (38.79%), followed by appraisal cost (29.93%), internal failure cost (15.92%) and the smallest portion was in external failure cost (8.22%). It revealed that companies preferred putting efforts for prevention during the process of generating products and services to focusing on efforts in appraisal of product and service quality. If we compare average cost of control (68.72%) to cost of failure (24.14%), it can be concluded that companies greatly concerned about doing controlling activities in the effort to reduce failure activities. From the outcome of Table 1 we also can see that the smallest portion spent for costs of quality is for external failure cost.

Table 1. Costs of quality Average

Appraisal Costs	29.93%	Costs of Control	68.72%
Prevention Costs	38.79%		
Internal Failure Costs	15.92%	Costs of Failure	24.14%
External Failure Costs	8.22%		

If we look at the spending based on the classification of company scale (Table 2), we can see that large and medium scale companies spent the biggest portion for prevention costs (38.91% and 44.76%) while small scale companies focused more on appraisal costs, which was as much as 41.26%. Large and medium scale companies also spent more internal failure costs more than external failure costs. Only small scale companies that spent more for external failure costs than for internal failure costs. All companies, however, stated that on average they spent more for costs of control average than for costs of failure.

Table 2. Costs of quality Average based on Enterprise’s Scale

	Big	Medium	Small	Average
Appraisal Costs	38.21%	37.59%	41.26%	38.36%
Prevention Costs	38.91%	44.76%	31.36%	40.84%
Total Costs of Control	77.12%	82.35%	72.62%	79.20%
Internal Failure Costs	13.51%	13.74%	7.69%	12.71%
External Failure Costs	9.37%	3.92%	19.42%	8.09%
Total Costs of Failure	22.88%	17.66%	27.11%	20.80%
% of Sales	3.64%	5.03%	6.40%	4.81%

Implicitly it can be said that quality control activity in small scale companies was not yet optimum compared to that in large and medium scale companies. It can be seen from average failure cost spent by small scale companies, which was the highest (27.11%) compared to that spent

by large and medium scale companies. This result was in line with average control cost spent by small scale company, which was also the lowest (72.62%) of all. In regards to percentage of quality cost against sales achieved by the companies, it can be said that the biggest portion spent for costs of quality was experienced by small scale companies (6.40%) whereas large scale companies spent the lowest portion (3.64%) for costs of quality.

We can see from Table 2 that the average failure cost of costs of quality spent by medium and large scale companies was more for internal failure. In general, companies spent internal failure cost due to product defect that required reparation activities. It can also be said that medium and large scale companies performed quite strict inspection to detect product defect before their product were at customers' hands. On the other hand, however, it was a sign that the companies lacked of attention to things that could prevent product defect. One of the ways that could have been done to push down the failure cost was by doing product development activities in accordance with the standard applied.

Unlike medium and large scale companies, small scale ones spent their average failure cost of cost of quality for external failure cost. Most probably it was due to their not knowing how to handle customers' complaints properly or their not having adequate warranty system in handling replacement or reparation of defected products which were still in their warranty period. It needs understanding or fixing up of procedure as well as monitoring and evaluation performed by external parties to guarantee that the companies have committed to good quality improvement.

4.2. Costs of quality Proportion

From the proportion calculation of costs of quality, Table 3 shows that there were 55 companies (67.07%) which spent prevention cost more than appraisal cost; and there were 58 companies (70.73%) which spent more proportion for internal failure cost more than external failure cost. Table 3 also shows that some large scale companies (96.34%) spent more proportion for control cost than failure cost.

Table 3. Costs of quality Proportion

Appraisal Costs	27	32.93%	Costs of Control	79	96.34%
Prevention Costs	55	67.07%			
	82	100.00%			
Internal Failure Costs	58	70.73%	Costs of Failure	3	3.66%
External Failure Costs	24	29.27%			
	82	100.00%		82	100.00%

The research findings above were in line with the analysis that looked at company scale (Table 4). Most companies showed that cost of quality elements of companies, that was chosen as the subject of this research, held a great deal of portion spent for prevention cost since no matter little the failure was, it would bring fatal impact when it reached customers' hands. It would be better, therefore, if prevention was done in a very earlier stage. However, this condition would be different if the analysis was done by looking at the characteristics and distribution of costs of quality in each

different type of industry.

Table 4. Costs of quality Proportion based on Enterprise’s Scale

	Big		Medium		Small		Total	
Appraisal Costs	6	50.00%	7	35.00%	3	50.00%	16	42.11%
Prevention Costs	6	50.00%	13	65.00%	3	50.00%	22	57.89%
Total	12		20		6		38	
Internal Failure Costs	8	66.67%	17	85.00%	0	0.00%	25	65.79%
External Failure Costs	4	33.33%	3	15.00%	6	100.00%	13	34.21%
Total	12		20		6		38	
Costs of Control	11	91.67%	20	100.00%	6	100.00%	37	97.37%
Costs of Failure	1	8.33%	0	0.00%	0	0.00%	1	2.63%
Total	12		20		6		38	
< 2.5% of Sales	5	41.67%	5	25.00%	0	0.00%	10	26.32%

By analysing cost of quality above, a picture of items included in costs of quality as well as each allocation for each element of costs of quality can be obtained. The result of the analysis indicated that the company management was able to know what costs that needed to be added to reach optimum costs of quality. However, it was a process that the companies had to do continuously to achieve a better result. To reach optimum costs of quality, the companies had to put their efforts to optimise each element of costs of quality. A strategy that a company can do is reducing failure cost by solving problems related to quality by employing the existing quality tools. The companies also needed to properly consider both short-term and long-term investment for prevention activities and put their efforts to reduce appraisal cost to a relevant limit.

In case of medium and large scale companies, it was possible for them to do the strategy more continuously and in a structured manner because they were supported by sufficient resources. Attention should be paid more to small scale companies which could not yet put their concern on quality control activities because they lacked of financial resources, physical infrastructure and human resources. It can be seen from the cost of quality proportion spent by small scale companies, which was the lowest one. The government or through its related agencies can mentor them by providing training on analysing control of the companies upon cost of quality, including identification of activities related to quality, cost bearing and reporting. Support from the government can also be given in a form of grant or subsidiary for quality improvement among small scale companies. This way, internal financial resources of the companies could be shifted to another focus, which were operational and strategic activities.

5. CONCLUSION

The research concluded that the costs of quality in all surveyed companies categorized costs of quality (CoQ) as prevention, appraisal, and failure costs. The costs of quality were allocated as

prevention cost 38.79%, appraisal cost 29.93% and failure cost 24.14% (internal failure cost 15.92% and external failure cost 8.22%). The result indicated that most of SME's more focused on prevention costs than appraisal costs. It proved that they were concerned with preparing the precaution of quality in the planning at the initial process. A study of SME's in Yogyakarta revealed that majority of SME's spent the costs of quality on controlling cost (68.72% of total costs of quality) in order to decrease failure cost. It also reported that the costs of quality 4.81 % of sales (on average).

From the analysis above, it can be concluded that most companies preferred putting efforts for prevention during the process of generating products and services to focusing on efforts in appraisal of product and service quality. Companies also put great concern about doing control activities in their effort to reduce failure activities. Based on these facts, it can be concluded that companies were already on the right track in their effort to control costs of quality. Their understanding on spending not too much money on appraisal cost was relatively good since appraisal activities tended to be those that had no added value and the money spending for these activities needed to be reduced. The smallest portion of spending was for external failure cost, which was enabled due to tracking and loading external failure cost that was difficult to be measured accurately and, instead, was based on prediction and rough estimation.

Reporting cost of quality was also very significant to help the management of the companies make decisions to set steps of improvement that would be done to be able to produce good quality products without spending too much money allocated for cost. The management of the companies could also make long-term decision based on the reporting of by minimising costs and improving quality. Quality improvement would generate impacts on consumers' loyalty since they felt that their needs were satisfied as they expected. The long-term impact was that the companies would be able to increase their profit and the trust of the consumers to the products or services the companies generated, which eventually could affect competitiveness among companies.

In order that the progress occurring in cost of quality can be immediately noticed and evaluated, the companies should make cost of quality report that is adequate and accompanied with analysis of cost of quality analysis made regularly. Other than measuring quality financially, the companies should also measure quality based on non-financial matters since product failure also generates non-financial loss that have long-term impacts, such as the reputation of the companies.

REFERENCES

- [1] Campanella, J. (1999). *Principles of Quality Costs: Principles, Implementation, and Use*, 3rd ed., Milwaukee: ASQ Quality Press
- [2] Daya Saing 60% Produk Indonesia Lemah di ASEAN (2012), retrieved 13 March 2013 from <http://www.gatra.com/ekonomi-1/8431-daya-saing-60-produk-indonesia-lemah-di-asean.html>

- [3] Felecia, Tessa Vanina Soetanto. (2004). Peningkatan Daya Saing Industri Melalui Analisa Biaya Kualitas, Studi Kasus pada Perusahaan Bahan Baku Makanan. *Jurnal Teknik Industri*. Vol. 6, No. 1, Juni 2004, hal. 86-92.
- [4] Hadi, Kunto. (2003). Analisis Pengaruh Biaya Kualitas terhadap Harga Pokok Penjualan pada Industri Pemintalan Benang di PT. Primayudha Mandirijaya. Thesis tidak dipublikasikan. Universitas Diponegoro.
- [5] Lee, Choong Y. (2004). "Perception and Development of Total Quality Management in Small Manufacturings: An Exploratory Study in China". *Journal of Small Business Management*. Vol. 42. No. 1. pp 102
- [6] Magd, Hesham and Curry, Adrienne. (2003). ISO 9000 and TQM; are they complementary or contradictory to each other?. *TQM Magazine*. Vol. 15, No. 4, pp. 244-256
- [7] Mandal, P., Love, P.E.D., Sohal and Bhadury,B. (2000). The Propagation of Quality Management Concept in The Indian Manufacturing Industry: Some Empirical Observations". *The TQM Magazine*, vol.12, No. 13, pp 205-13.
- [8] Mugan, C.S & Erel, E. (2000). Distribution of Quality Cost: Evidence from aeronautical firm. *Total Quality Management*, Vol. 11, No. 2, pp. 227-234
- [9] Sekaran, Uma.1992. *Research Methods For Business: A Skill-Building Approach*, 2nd Edition, Canada: John Weley & Sons Inc.
- [10] Suarjaya, Dedy. (2010). Biaya Kualitas. Retrieved 19 September 2011 from <http://dedysuarjaya.blogspot.com/2010/09/biaya-kualitas.html>
- [11] Tatikonda, L.U. & Tatikonda, R.J. (1996). Measuring dan Reporting the Cost of Quality. *Production and Inventory Management Journal*. Second Quarter, 37.
- [12] Tingkatkan Daya Saing Untuk Melawan Produk Asing (2012). Retrieved 13 March 2013 from <http://www.presidentri.go.id/index.php/fokus/2012/01/05/7570.html>