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Assessing total quality management and its impact on product quality: A cross-sectional study on textile industries in Bandung, Indonesia

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Abstract

This study aims to predict the total quality management in medium to low-income companies in the textile industry in Bandung, Indonesia. The implementation of total—quality management is one of the company's essential requirements. Previous studies indicate that the practice of quality management can improve the organizational performance in textile industry. We conducted a cross sectional survey study. The data is taken from the employees of textile industry. We made predictions using a non-parametric approach where the results of this study indicate several essential factors in implementing total quality management. This research is based on previous research studies that show the role of TQM in the textile industry and how it plays an essential role in the organization's success, especially in producing quality products. Moreover, the results of the study indicate that it is necessary to pay attention on the active role of management in quality improvement planning as it will improve the quality of products which is good for textile organization. Furthermore, this study examines the total quality management of low-income companies that fills the research gap.

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1. Introduction

During the COVID-19 pandemic in Indonesia, the textile industry experienced a contraction in production growth. During the COVID-19 pandemic, market conditions became out of control, and there was a lack of product absorption and high uncertainty (BPS (Statistics Indonesia), 2020). The role of management is essential because, in such conditions strong management can lead the company in the right direction by optimizing the resources of company aptly (Baig et al., 2021; Qureshi, Shaikh, & Seaman, 2021). The quality insurance policy must be monitored for the quality of production (Bhatti, Akram, Bhatti, Riaz, & Syed, 2021; Saira, Mansoor, & Ali, 2020). The presence of product quality in the textile industry is one of the factors considered by the company (Sabirov, Suyunov, Aslonov, Subhonov, & Kamilov, 2021). Quality product is one of the factors that determines the company's overall performance (Shen & Chen, 2020). The company's goal to produce quality products is because of progressive competition in the market (Gherardini, Renzi, & Leali, 2017; Ibidunni, Salau, Falola, Ayeni, & Obunabor, 2017). (Prasad, Dhiyaneswari, Jamaan, Mythreyan, & Sutharsan, 2020). To improve product quality, implementing total quality management (TQM) is one of the important factors for companies to achieve organizational goals (Addis, 2019; Ali, Hilman, & Gorondutse, 2020; Uluskan, McCreery, & Rothenberg, 2018).

One of the previous researches by Zhang, Waszink, and Wijngaard (2000) conducted a total quality management measurement test that tested 212 manufacturers in China. Previous studies Aziz, Sumantoro, and Maria (2019) and Eniola, Olorunleke, Akintimehin, Ojeka, and Oyetunji (2019) have shown the role of organizational culture in implementation of total quality management. Their research indicates, the good

TQM can improve the performance of the small and medium enterprises (SMEs) in Nigeria. Furthermore, the results of this study indicate that without the active role of workers the implementation of TQM cannot be carried out properly. Bajaj, Garg, and Sethi (2018) used the Pareto analysis in which a review based on 102 articles over 20 years showed the results of implementing TQM, that contributed to company's reputation. By using a multi-regional sample Bouranta, Psomas, Suárez-Barraza, and Jaca (2019) examines the importance of TQM for company's leadership in production of quality products. The results of this study show that several essential factors are part of TQM, such as top quality management, the working process of management, focus on customers, and the importance of education and knowledge of employees. Slightly different from the results of previous research Psomas, Vouzas, Bouranta, and Tasiou (2017) used a sample of local authorities in Greece, which showed no positive benefits from TQM; however, the application of total quality management was beneficial for employee's job satisfaction, , and increasing operational performance. Research conducted by Wall (2021) shows the results of implementing TQM for quality products in manufacturing and service companies in Thailand. Thai and Jie (2018) shows that the TQM in a company can decrease shipping costs and have a positive impact on service quality. Sahoo and Yadavb (2020) show in their research, an increase in production operational performance by implementing TQM in 72 manufacturing companies in India.

In the textile industry, the implementation of TQM plays an essential role in strengthening organizational culture (Araújo, Santos, da Costa, & Sá, 2019). With a technology transfer approach the effect of TQM on textile companies in Istanbul, Turkey (Bolatan, Gozlu, Alpkan, & Zaim, 2016). Similarly, a previous study by Mahmood, Qadeer, and Ahmed (2015) examined the effect of TQM on organizational performance based on the perceptions of 270 managers in 90 textile companies in Pakistan. It indicated that TQM had a positive influence on organizational performance and it was influenced by cultural diversity, as it was witnessed in a survey of 210 textile companies in developing countries (Shafiq, Lasrado, & Hafeez, 2019). After reviewing the previous researches, we conducted exploratory research on the implementation of TQM in lower-middle companies in the textile industry. Based on previous researches, the role of TQM in the textile industry plays an essential role in the organization's success; however, there is still no research that examines the secondary textile companies and the current study fills this gap.

2. Literature Review

2.1. TQM and Product Quality

The efforts to improve quality have become the main goal of textile industries. (Iqbal & Asrar-ul-Haq, 2018). One way to improve organizational performance in implementing TQM is to implement quantitative and HR methods that can improve organizational processes to fulfil customer needs (Kaur, Singh, & Singh, 2019). In addition to this, TQM is a principle that guides organizations to develop sustainability. TQM can help organizations in improving customer satisfaction level, producing quality goods or services, increasing productivity, reducing time, and inventions of raw materials. Previous studies have provided evidences of the positive impact of TQM on the performance of organizations (Anil & Satish, 2019). TQM can impact company's performance such as the performance of quality products (Sahoo, 2019). Quality products are one of the critical competitive factors, where organizations/companies that can provide higher quality at the same price remain at competitive advantage (Yu, Park, & Hong, 2017) . (Kaur et al., 2019).

The TQM approach implemented by the organization/company refers to comprehensive improvements (Yeng, Jusoh, & Ishak, 2018). Implementing TQM can contribute to organizational performance (Petcharit, Sornsaruht, & Pimdee, 2020). The implementation of TQM can minimize costs and can produce high-quality products (Ferdousi, Baird, Munir, & Su, 2018). The organizational/company performance impacts competition, as shown by Krajcsák (2019) which aims to empower employees to produce quality products/services. These quality products/services can have an impact on customer's satisfaction (Mittal & Gupta, 2021). It says that product quality is essential for every organization to achieve good reputation (Wall, 2021). Organizations need to prioritize their quality products/services to have a competitive advantage over other company owners (Anil & Satish, 2019).It should be organization's primary concern to improve the quality of products (Kaur et al., 2019).

H1: The better the implementation of TQM, the higher the quality of the products.

3. Method

This study uses a cross-sectional survey approach to know the total quality management (TQM) conditions that existed during the COVID-19 pandemic in the textile industry in Bandung City, Indonesia. This study also predicts the dimensions that makeup TQM using a non-parametric approach. The survey was conducted for two months by distributing questionnaires via google form. The questionnaires were distributed to employees, who work in textile companies in Bandung, Indonesia, through their supervisors who could have coordinated directly with employees. The textile companies that became the research target were 24 with 336 employees who answered the questionnaires. The measurement of total quality management uses an instrument developed in a previous research (Saraph, Benson, & Schroeder, 1989). The research instrument consists of eight factors that make up the total quality management with 59 questions. The product quality instrument uses an instrument developed by Joseph, Rajendran, and Kamalanabhan (1999)

with 7 statement items. Based on the results of the calculation of the outer loading test of the research instrument, four instruments have an outer loading value of < 0.70. Thus, the research instrument tested further only amounted to 55 statement items. The research instrument uses a Likert scale from strongly agree to strongly disagree, divided into 7 points. After testing the validity and reliability of the research the next step is to test the dominant factors that formed the TQM variable.

Table 1. Demographics data.

Demographics data	F	%
Gender		
Male	145	43.20
Female	191	56.80
Age		
< 30 Years	300	89.30
31 – 40 Years	31	9.20
41-50 Years	6	1.803
> 50 Years	2	0.60
Department		
Production	71	21.10
Human resources development (HRD)	15	4.50
Finance and accounting	31	9.20
Marketing	64	19.00
Sales	83	24.70
Public relation	10	3.00
Others	96	28.60

4. Result and Discussion

Descriptive data regarding the demographics of the respondents can be seen in Table 1.

Based on Table 1 calculations, regarding the demographics of respondents shows that the gender of the majority of respondents is female. This is because, the majority of workers in textile companies are women and moreover, in this study, 56.80% were female respondents. As far as the age of the respondents is concerned the majority of females were less than 30 years of age, which was 89.30%. This condition is because, in this age group, respondents can understand the questions as well as) electronic equipments to answer questionnaire distributed via google form. By department or division, many respondents were from other divisions such as production, quality control, and finishing, with ratio of 28.60%.

After the data was collected, this study summarized the answers of respondents and the results were tested by the research instrument's outer loading. The results of the outer loading test, the mean and standard deviation of the dimensions of the role of management leadership and quality policy (LQ), the dimensions of process management (PM), the training dimension (TR), and the supplier quality management (SQM) dimension, the product/service design (PD), and the role of the quality department (QD) dimensions, the quality data and reporting (QDR), and employee relations (ER) dimensions and product quality (QL) shows in Table 2.

Table 2. The results of instrument's outer loading.

Instrument	Loading	Mean	SD	Instrument	Loading	Mean	SD
LQ.1	0.722	40.506	0.761	PM.2	0.713	38.274	0.732
LQ.2	0.792	40.089	0.778	PM.3	0.779	38.482	0.786
LQ.3	0.821	40.238	0.728	PM.4	0.839	40.804	0.738
LQ.4	0.818	40.179	0.712	PM.5	0.873	40.536	0.726
LQ.5	0.849	40.536	0.718	PM.6	0.841	41.190	0.759
LQ.6	0.829	39.911	0.680	PM.7	0.824	39.970	0.759
LQ.7	0.791	39.167	0.677	PM.8	0.744	39.018	0.732
LQ.8	0.839	39.048	0.774	PM.9	0.845	39.911	0.762
LQ.9	0.809	39.315	0.727	PM.10	0.828	40.506	0.803
LQ.10	0.770	38.125	0.731	PD.1	0.822	41.310	0.776
LQ.11	0.739	38.988	0.800	PD.2	0.874	39.940	0.728
LQ.12	0.704	38.363	0.724	PD.3	0.839	39.375	0.744
LQ.13	0.754	40.506	0.761	PD.4	0.888	40.000	0.753
SQM.1	0.724	38.274	0.802	PD.5	0.847	39.792	0.730
SQM.2	0.794	38.869	0.732	PD.6	0.726	38.482	0.805
SQM.3	0.720	38.095	0.768	ER.1	0.818	38.363	0.776
SQM.4	0.781	38.333	0.717	ER.2	0.821	38.542	0.780

Instrument	Loading	Mean	SD	Instrument	Loading	Mean	SD
SQM.5	0.719	35.982	0.762	ER.4	0.814	39.018	0.828
SQM.6	0.713	35.804	0.846	ER.5	0.791	38.095	0.760
TR.2	0.768	39.494	0.821	ER.6	0.851	38.869	0.736
TR.3	0.758	39.494	0.806	ER.7	0.801	39.732	0.774
TR.4	0.758	38.720	0.783	ER.8	0.778	39.345	0.804
TR.6	0.716	37.113	0.844	QD.1	0.802	39.018	0.802
TR.7	0.747	38.958	0.790	QD.2	0.853	40.268	0.754
TR.8	0.797	39.643	0.756	QD.3	0.777	38.393	0.743
QDR.1	0.825	38.929	0.814	QD.4	0.827	39.226	0.732
QDR.2	0.862	38.958	0.820	QD.5	0.828	39.940	0.691
QDR.3	0.819	38.571	0.805	QL.1	0.817	39.792	0.808
QDR.4	0.811	38.839	0.754	QL.2	0.835	38.333	0.818
QDR.5	0.859	39.554	0.745	QL.3	0.816	39.196	0.793
QDR.6	0.873	39.167	0.756	QL.4	0.809	39.732	0.804
QDR.7	0.876	39.196	0.774	QL.5	0.516	32.560	107.062
QDR.8	0.833	38.542	0.821	QL.6	0.535	32.560	102.504
				QL.7	0.697	36.845	0.843

Table 3. The validity and reliability of the research construct.

Construct	Cron. alpha	rho_A	Comp. reliability	Av. var. ext. (AVE)
ER	0.913	0.914	0.931	0.657
LQ	0.949	0.950	0.955	0.622
PD	0.912	0.915	0.932	0.696
PM	0.934	0.936	0.945	0.658
QD	0.876	0.877	0.910	0.669
QDR	0.943	0.943	0.952	0.714
SQM	0.892	0.898	0.914	0.571
TQM	0.985	0.986	0.986	0.515
TR	0.923	0.924	0.940	0.723
QL	0.853	0.887	0.885	0.532

From Table 2, it seems that all items show an outer loading value greater than 0.5, this indicates that all indicators work well in the model used thus, all indicators have a high correlation with the latent construct while the standard deviation has a low value this shows that the item values are similar for measuring the dimensions of the role of management leadership and quality policy (LQ), the dimensions of process management (PM), the training dimension (TR), the supplier quality management (SQM) dimension, the product/service design (PD), the role of the quality department (QD) dimensions, the quality data and reporting (QDR), employee relations (ER) dimensions and product quality (QL) show that all indicators work well on the model. Furthermore, the standard deviation has a low value but the item values used are similar. Therefore, the model is accurate. After calculating the outer loading, the next researcher analysed the validity and reliability of the research construct as described in Table 3. Table 3 shows that the research instrument is valid and reliable, which is indicated by the Cronbach Alpha value for each variable and it has a value above 0.7. This result means that all variables have a high level of data reliability greater than 0.7 so that all indicators have high internal consistency. Therefore, based on Average Variance Extracted (AVE), all variables show values above 0.5, and all variables have high convergent validity that meets the requirements of testing model. Furthermore, after getting the results of testing validity and reliability of the research construct, the researcher tested the most dominant factor of forming TQM. The calculation results are explained in Table 4.

Table 4. Coefficients results.

Path	Coefficients	Sample mean (M)	St. dev.	T statistics	P values
ER -> TQM	0.129	0.129	0.006	22.704	0.000
LQ -> TQM	0.213	0.213	0.009	23.889	0.000
PD -> TQM	0.107	0.107	0.004	24.176	0.000
PM -> TQM	0.162	0.161	0.005	30.945	0.000
QD -> TQM	0.086	0.086	0.005	17.032	0.000
QDR -> TQM	0.155	0.156	0.006	25.182	0.000
SQM -> TQM	0.124	0.124	0.005	22.968	0.000
TR -> TQM	0.147	0.147	0.006	24.540	0.000
TQM -> Product quality R square 0.407. P-value= 0.000	0.639	0.642	0.067	9.527	0.000

It is based on the calculation of the coefficients of each dimension of TQM as shown in Table 4 it is known as the most dominant forming factor of TQM and it is also the dimension of the role of management leadership and quality policy, with a coefficient value of 0.213. The second dominant dimension is the dimension of the management process with a coefficient value. 0.162, while the third dimension is quality data and reporting with a coefficient value of 0.155. The other dimension values are as follows, the dimension with the fourth-highest value is the training dimension with a coefficient value of 0.147. Then, the dimension that has the fifth-highest value is the employee relations dimension with a coefficient value of 0.129. The dimension that has the sixth-highest value is the supplier quality management dimension with a coefficient value of 0.124. The dimension value that has the seventh-highest value is the product/service design dimension with a coefficient value. 0.107, and the last is the dimension of the role of the quality department with a coefficient value of 0.086.

In order to get a clear picture of the results of this study, the researcher presents a picture of the result's calculation as shown in Figure 1.

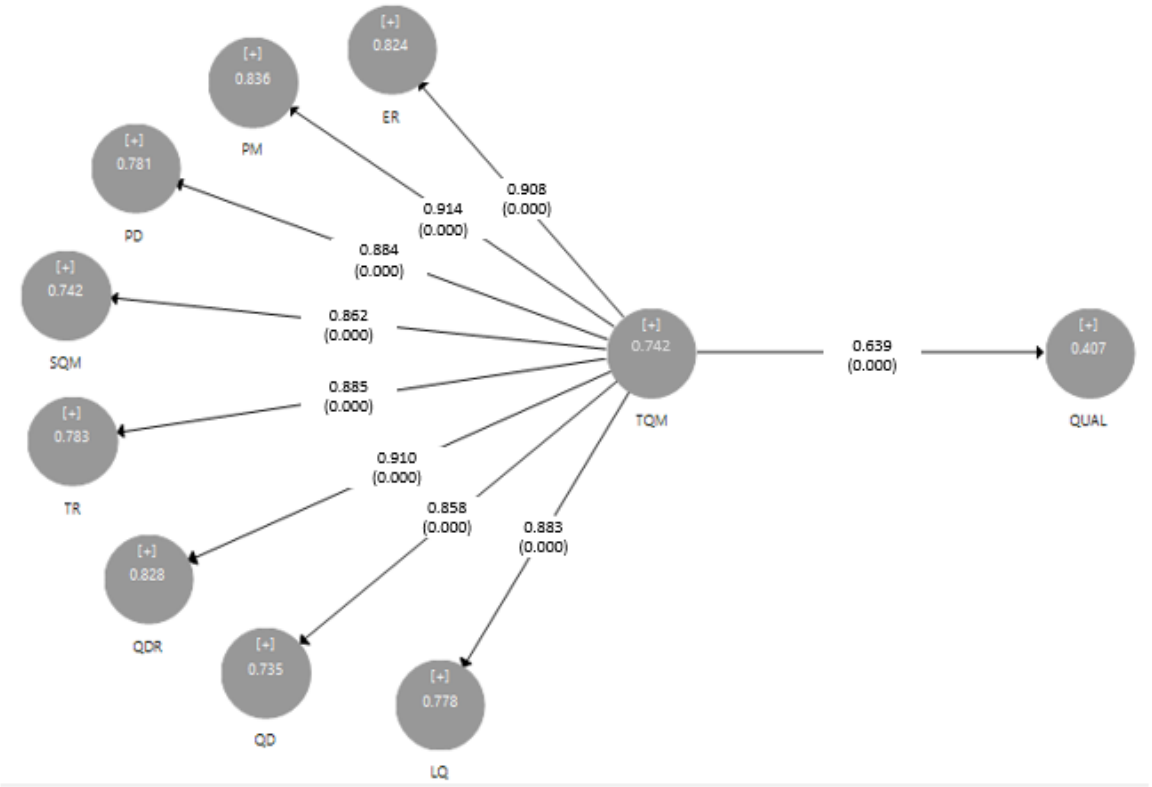

Figure 1. The results of the calculation of research data analysis.

As explained in Table 4, it shows that the TQM coefficient on product quality is 0.407 with a p-value = 0.000, so it indicates that the research hypothesis proved right. The calculation result of the R square is 0.407 or 40.7% influenced by TQM. These calculations indicate that the implementation of TQM will impact improving product quality. From the calculation's results, it can be seen that the most critical factors for TQM in the textile industry with a lower-middle-class company are the roles of management leadership and quality policy. The results indicate that the acceptance of quality responsibility by the head of department is optimal in carrying out his duties. There is a top management evaluation process that is going to improve the quality of production. The participation of top management is to improve the quality of textile production and to focus on achieving quality objectives. It is essential to improve quality by considering costs and production expenses. The company has also planned a comprehensive quality achievement plan. The results of this study follow the research by Basheer, Hafeez, Hassan, and Haroon (2018), that TQM can be appropriately implemented in 248 textile industry companies in Pakistan and increase in production was witnessed

The dimension of the management process is the second important factor that forms TQM. The management process dimension has a high coefficient value of 0.162. It is the dominant variable, so it is imperative to carry out TQM supported by a quality management process especially, in terms of adequate statistical process control to create a good TQM pattern that can map the quality of the product produced accurately

The third dominant factor that forms TQM is the dimension of data quality and reporting. The quality data and reporting dimension show how cost-effective quality is effective in maintaining and improving

product quality. The results of this study indicate that feedback of customers prove effective among managers and employees in dealing with problems that occur in the company. Barata and Cunha (2017) studied a close relationship between quality data and its availability in supporting the integrity of TQM in producing excellent products/services. This study indicates that these three dominant factors have a high impact on TQM, so if the three dominant factors increase, it will create quality TQM.

The dimension with the fourth-highest value is the training dimension with a coefficient value of 0.147. This finding indicates that the company has provided training to improve product quality for all employees. This factor forms an important TQM, as it was seen in previous research Ahmed and Idris (2020) shows the training provided to employees for implementing effective TQM. Likewise, training can successfully implement practical TQM in the education services sector (Godfrey, 2018).

The fifth factor is the employee relations dimension, with a coefficient value of 0.129 indicating that the TQM implementation process must be supported by good employee relations. In the TQM process, there are severe obstacles. The results of this study support previous research Bakotić and Rogošić (2017) which showed the role of employee development and involvement in the successful implementation of TQM using data from large companies in Croatia.

The dimension of supplier quality management with a coefficient value of 0.124 indicates that in forming TQM, suitable management suppliers are ready to assist in developing the company's products by preparing the raw materials and making these products with good quality. This supplier quality management dimension is the sixth factor that makes up TQM. The critical role of the supplier quality management dimension shows that supplier quality management face the challenges of Industry 4.0 (Gunasekaran, Subramanian, & Ngai, 2019).

The product/service design dimension with a coefficient value of 0.107 indicates that the company in carrying out the TQM process must be supported by a quality product/service design, especially in terms of clarity of specifications that will facilitate the company's products. The company's scrub-down process indicates the importance of product/service design dimensions. Likewise, with the involvement of all departments related to design reviews and clarity of product specifications and management emphasizes productivity and quality. While designing, the design thinking tool sit is necessary to pay attention on the development of innovation so that, it can produce broader services (West & Di Nardo, 2016). TQM approach is applied in production of innovative products by involving the Executive Management Teams (Chen & Reyes, 2017).

The role of the quality department with a coefficient value of 0.086 is the variable with the lowest value. In this case, indicating that Quality data and reporting in principle does not have a significant impact on the implementation of TQM but needs to consider the evaluation step of managers and employees based on the quality of its performance. Of course, this will further improve the quality of the TQM. The dimension role of the quality department indicates the autonomy of the departmental responsibility for quality insurance. There is coordination between departments in implementing quality improvement, and there is effectiveness in the departments responsible for improving product quality. This study also follows research Tortorella, Giglio, Fogliatto, and Sawhney (2019) which presents the important role of quality company operations in implementing effective TQM. The study examined cross-sector data on 135 manufacturing companies in Brazil. The results of the study strengthen previous studies such as those conducted by Wall (2021); Thai and Jie (2018) and Anil and Satish (2019) which prove that the application of TQM will produce quality products.

The application of TQM in textile companies, especially in the middle to lower business classification, is good. At the COVID-19 pandemic, the expected textile products were quality products at competitive prices. To maintain product quality in textile, top management carrying out TQM implementation needs to improve the organizational performance to compete consistently.

5. Conclusions

The application of TQM in the textile industry has carried out well by companies with middle to lower business classifications. The results of this study contribute to the gap in previous researches that complements the study using the perception of employees working in the textile industry with a lower-middle-class business classification. The implications of the results indicate that the most dominant pending factor forming TQM is the role of management leadership and quality policy factor than the management process factor. Other factors influencing TQM are customer focus, continuous system improvement, education and training, controlled freedom, shared goals, and employee's involvement and empowerment. All of these factors are other factors that are not included in this study. In principle, TQM is an important step that companies must take because management leadership and quality policy factors are crucial to support the implementation of quality TQM.

In principle, TQM is an important step that the company must take because management leadership and quality policy factors are significant to support the implementation of quality TQM. Especially with the current conditions where the company faces the COVID-19 pandemic, which made market conditions worse, being out of control and the lack of product absorption by consumers. Leadership role in managerial support

of the TQM development pattern and tightened quality policies to create superior competitive products that can attract customer's' interest.

Textile products expect to be products with a low price but have reasonably good quality. In order to produce cheap, quality, and competitive products, the application of TQM process needs to apply appropriately. The results of this study support previous researches, which proves that TQM can be applied properly with the support of management and organizational members in the textile industry.

Researchers provide recommendations so that the implementation of TQM can work successfully; it is necessary to pay attention to the active role of management in supporting quality improvement planning to produce quality products that will have implications for improving organizational performance. However, this research still has shortcomings due to the limitations of researchers, such as companies with a lower-middle business classification not involving companies with a medium-to-upper class classification. For this reason, the researcher suggests that future research can use a more comprehensive sample of companies.

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