



Impact of total quality management on corporate green performance through the mediating role of corporate social responsibility

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ABSTRACT

Considering the environmental deterioration mainly caused by manufacturing industries and inadequate studies identifying the factors facilitating firms to counter this issue, the current study aims to examine the underlying relationship between total quality management (TQM) and corporate green performance (CGP), and analyses how TQM impacts on CGP. This study also investigates the role of corporate social responsibility (CSR) in the relationship between TQM and CGP and examines how CSR mediates the relationship between them. Six TQM practices are taken from the American "Malcolm Baldrige National Quality Award"; CGP includes green management strategies, green processes and green products performance; and CSR comprises of social, employees and customers dimensions. The researcher collected data from the managers of the medium and large-size manufacturing firms located in Pakistan. The structural analyses indicated a significant and positive impact of TQM on CGP with β and p-values of 0.259 and 0.003, respectively. This indicates TQM significantly enhances organizational capabilities to achieve green performance objectives. TQM also indicated a significant and positive impact on CSR with a β -value of 0.271 and a p-value of 0.002; moreover, a similar impact of CSR is found on CGP with β and p-values of 0.189 and 0.018, respectively. Finally, CSR is found to act as a partial mediator in the relationship between TQM and CGP. The contextual analysis indicates that TQM is equally important for all sizes firms for CGP; however, the level of CSR varies. Moreover, government support is imperative for firms to achieve CGP objectives.

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1. Introduction

During the last two decades, businesses, particularly the manufacturing ones, started facing growing pressure from different stakeholders to consider the impact of their operations on the natural environment (Abbas and Sağsan, 2019). The continuous efforts by the ecologists to create public awareness about declining natural resources (Wijethilake, 2017), change in natural climate and significant increase in the air, water and soil pollution (Li et al., 2018) is pushing manufacturing firms to abandon their reliance on fossil energy resources causing environmental hazards and start capitalizing on renewable resources (Ji and Zhang, 2019; Sepehri and Sarrafzadeh, 2018). In addition to increased customers' awareness, local and international regulations to preserve the natural environment also have forced businesses to consider the

impact of their operations on the natural environment and follow environment-friendly (Davenport et al., 2018) or green production processes (Fernando et al., 2019). This scenario has also changed the demands and preferences of customers and encouraged them to opt the products or services of firms causing minimum damage to the natural environment (Masocha, 2018). For this reason, companies have to ensure not only quality in their products and services, but also make it certain that their activities are not harming the natural environment.

Corporate green practices have great potential to counter the issues pertaining to the natural environment. The concept of corporate green performance (CGP) focuses on introducing new or improving the existing products or processes (Amores-Salvadó et al., 2014) in a way that it not only fulfils the customers' expectations with respect to quality, but also results in improved environmental performance (Yu and Huo, 2019). CGP is linked with green product, green process (Xie et al., 2019) and green management (Li et al., 2018) practices to mitigate the environmental challenges caused by production activities. Green innovation is also

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linked with CGP through which firms introduce new technologies which enable them to produce, assimilate or exploit product, process or management activities which minimize environmental issues, such as pollution, and resources consumption, caused by organizational activities. However, according to Zhang et al. (2019) and Wang (2019), studies pertaining to green performance are in the early phase and there is a strong need to enrich the literature on this area.

One of the factors which could help organizations to enhance their green performance is total quality management (TQM). TQM is a management system that has the potential to boost the individual as well as organizational performance. It not only facilitates organizations to attain competitive advantage (Zwain et al., 2017), but also leads to the development of competitive products and services, with superior quality, at minimum cost and delivery time (Qasrawi et al., 2017). TQM is also believed to be an environment-friendly system as it aims to minimize waste through efficient utilization of resources (Yusr et al., 2017). Moreover, through its focus on training and development and continuous improvement in all aspects (Hollingworth and Valentine, 2014), TQM greatly enhances individual capabilities to innovate new or improve the performance of existing products or services (Shafiq et al., 2017). TQM may thus play a pivotal role in enhancing organizations capabilities to achieve green performance objectives.

Another factor which could enable firms to achieve green performance objectives is corporate social responsibility (CSR) (Shahzad et al., 2019). CSR is a voluntary initiative of firms to integrate the social and environmental concerns with the business operations (Gazzola and Pellicelli, 2009). Through CSR, firms take initiatives to preserve the social, cultural and economic aspects of the environment in which they operate (Raimi, 2017), and make an investment in the development of human capital (European-Commission, 2011). Saunila et al. (2018) and Makhdoom and Anjum (2016) stated that the philosophical roots of TQM, CGP and CSR concepts are similar. The more a firm invest in quality and social and environmental aspect, the more likely it is to achieve excellence in green performance.

Firms following quality management (Kenneth et al., 2019) and green performance strategies (Huang and Li, 2017) have great potential to respond to issues pertaining changing customers' preferences with respect to quality and green environment. However, according to Fernando et al. (2019) and Wang (2019), studies pertaining to green performance are in the early phase and there is a strong need to enrich the literature on this area. Moreover, different researches on this topic have yielded mix results. For instance, Li et al. (2018) analysed the impact of TQM on green innovation performance in Chinese manufacturing firms and found a significant negative relationship between the two variables. Zeng et al. (2017) also concluded that quality and environment management practices negatively affect the performance of firms. However, on the other side, Tasleem et al., (2018) found a positive correlation between TQM and corporate sustainable development. The study of Shahzad et al. (2019) on the impact of knowledge absorptive capacity and CSR on CGP also indicated significant positive results. However, Zhang et al. (2019) termed the achievement of CGP objectives with the government financial and technical support since it results in increased production time and cost.

These mixed results pertaining to different components of TQM, CGP and CSR signify the need for exploring the relationship between these variables in a comprehensive manner. Moreover, according to Li et al. (2018), there is scarce literature on the relationship between TQM and CGP, particularly in developing countries, such as Pakistan, where sustainability and green performance concepts are at an introductory level. Given TQM's prominence in the modern business world, this study will explain

how manufacturing businesses capitalise on their critical resources (such as TQM) to achieve green performance objectives, and how CSR mediates this relationship. The researcher adopted six TQM practices based on the American 'Malcolm Baldrige National Quality Award' (MBNQA), namely leadership, customer focus, strategic planning, process management, HRM, and information and analysis. Following Xie et al. (2019) and Li et al. (2018) recommendations CGP is measured through three dimensions, namely green product, green process, and green management performance. Finally, CSR is measured through three indicators, that is community, customers, and employees. Therefore, the current study aims to answer the following questions:

RQ1: What is the impact of total quality management on corporate green performance?

RQ2: Do corporate social responsibility mediate the relationship between total quality management and corporate green performance?

The current study will not only bridge the literature gap on the relationship between TQM, CGP, and CSR, but will also provide valuable insights to the management of manufacturing firms to achieve green development objectives through TQM and CSR. Considering the contextual factors, the current study takes organizational size (medium and large) as a control variable so that it can be explored that does firm-size matters to achieve CGP objectives.

2. Theoretical foundation

2.1. Green Theory and Green performance

With the emergence of the industrial revolution, the rate of natural resources consumption by the manufacturing industry to produce products and make money has been enormously high (Singh et al., 2018). This has resulted in a scarcity of natural resources, particularly for future generations, and the significant change in the natural environment, such as global warming (Ji and Zhang, 2019). Considering this issue, the United Nations Global Compact (UNGC) has made it compulsory for all businesses across the world to follow environment-friendly policies and green practices (UNGC, 2018). UNGC is the world's largest green environment initiator and includes more than 12,500 commercial and non-commercial signatories from more than 160 countries. The ecologists have also urged the businesses, particularly the manufacturing ones, to integrate green thinking and CSR activities into their operations as they not only demonstrate a positive impact on organizational economic performance, but also on environmental aspects (Raimi, 2017).

The green theory, a recent multidisciplinary form of thinking, focuses on environment, globalization, social responsibility, corporate governance, and human rights aspects, and was popularized by Eckersley (2010). The aim of the green theory is to achieve environmental sustainability at regional, state and international levels. The green performance takes its philosophical roots from green theory, and CGP represents the link between a firm's operations and the environment (Cancino et al., 2018). It provides key information about organizational processes and its compliance with environmental regulations (Rekik and Bergeron, 2017), representing the efficiency and effectiveness of organizational environmental actions. According to Yuan and Xiang (2018), to become a green organization, the firm focuses on transforming operations into environment-friendly activities by bringing fundamental reforms in operational processes of product/service.

Especially the manufacturing firms change the traditional view of the product lifecycle from resources acquisition to product development, delivery, consumption and recycling (Ho et al., 2016). According to Ma et al. (2017), firms committed to green practices have great potential to attract more customers. However, according to Zhang et al. (2019), government support is essential to encourage businesses to shift from traditional means of productions to green sources of operations.

According to Li et al. (2018), green performance is represented by green technology and green management practices. Xie et al. (2019) divided green technology into the green process and green product.

- Green processes refer to organizational initiatives to minimize the consumption of natural resources in production processes through which raw material is transformed into a valuable product (Ma et al., 2017). It has a special focus on the smooth shift from fossil energy to bioenergy or renewable energy (Xie et al., 2019). Through the green process, companies bring systematic improvement in their operational processes and ensure that their activities are not polluting natural environment, such as air, soil and water (Dai and Zhang, 2017).
- Green products refer to the introduction of new or improvement of existing products' design so that production process either consume non-toxic and biodegradable compound or minimum to zero amount of non-renewable energy resources so that energy efficiency can be improved by minimizing disposal or waste (Abbas and Sagsan, 2019). It also refers to product durability, recyclability, the input of environment-friendly raw material and elimination of noxious substances (Yu and Huo, 2019).
- Green management refers to the restructuring of existing or adoption of new management systems, strategies and policies which minimizes the negative impact of organizational production and management strategies and turn them into environment-friendly systems (Li et al., 2018).

2.2. Total quality management

TQM is a management system that focuses on continuous improvement through tools, techniques, and values (Mahmood et al., 2014). The ultimate goal of TQM is to increase customer satisfaction through improved quality of products and services with the least consumption of resources (Qasrawi et al., 2017). The MBNQA is an American quality award and is highly famous among the businesses (ASQ, 2018) for its role in revolutionizing thousands of public as well as private organizations with respect to management principles and gaining competitive advantage (MBNQA, 2019). For the current study, the researcher used six dimensions of MBNQA, namely leadership, process management, strategic planning, customer focus, information and analysis, and human resource management (HRM). A number of researchers, such as Ooi (2014) and Yusr et al. (2017) have also used these dimensions in their studies.

- Leadership refers to top management which sets organizational goals and objectives and develops strategies to achieve those goals. Leaders are responsible for quality assurance and improvement efforts in relation to time and cost.
- Strategic planning represents the organizational vision and mission for quality and policies and strategies to achieve quality goals.
- Customer focus signifies organizational efforts to know customers' demands and market trends. It also relates to

developing and maintain good relations with customers by ensuring their satisfaction.

- Process management relates to the clear division of processes, ownership, and responsibilities. It also aims to ensure the perfect product or service design through continuous improvement by automation and self-inspection.
- HRM focuses on employees' development through training and active participation in operational issues. It also concentrates on quality responsibility and awareness, employee empowerment and performance recognition and reward mechanism.
- Information and analysis relate to the knowledge management aspect of TQM, such as evaluation of workers' and managers' performance, maintaining a record about operational processes, proposing solutions to problems faced by workers and maintaining and using operational and market information to make effective decisions (Abbas et al., 2014).

2.3. Linking quality with Green performance

Taking into account the importance of natural resources, every business around the world face three basic issues, that is what is the input, what is the output and what gets wasted. According to Cancino et al. (2018), these issues are related to each other and their level is determined by the process quality. Products with poor quality significantly damage the organizational reputation and financial performance (Tasleem et al., 2018). Moreover, poor quality also results in wastage of human efforts (Habib et al., 2019) and natural resources, resulting in poor environmental performance (Calza et al., 2017). Considering the dynamics of the business world, organizations not only have to ensure quality and transparency in their operations, but also innovate or adopt new products or processes (Rossiter and Smith, 2018). From the green performance perspective, the new technology not only should have the ability to minimize the negative impact of organizational processes and leads to restoration of the natural environment (Cai and Li, 2018), but also enhance organizational development (Abbas et al., 2015; Zhang et al., 2019).

TQM has great potential to boost organizational capabilities to manage human and natural resources in efficient manners (Shafiq et al., 2017). Because of its focus on continuous improvement, TQM enables firms to ensure quality from resources acquisition to final product delivery (Singh et al., 2018). Siva et al. (2016) stated that TQM and environmental management are linked to each other since TQM aims for efficient utilization of resources, particularly natural resources, which is the core objective of CGP. Similarly, TQM has a long-term orientation by considering the impact of organizational activities on the environment and organizational performance over a longer period of time. According to Qasrawi et al. (2017), organizations should link their sustainable development objectives with quality management as it has great potential to improve organizational performance in all aspects of sustainability.

Considering the "Brundtland Commission" (UN, 1987) and UNGC (2000, 2018) suggestions the government of Pakistan has taken valuable measures to promote a green business environment in the country. Through "Punjab Green Development Program" the government of Pakistan is motivating and providing support to business communities to minimize their reliance on fossil energy and capitalise on renewable energy resources (World Bank, 2018). Moreover, the completion of one billion tree Tsunami project in 2017 (WEF, 2018), and the ongoing five years projects, such as ten billion tree Tsunami and green environment, with the support of business community are some other examples of government commitment to improve the natural environment and promote green business culture in the country.

Although the government is taking valuable measures to motivate firms to ensure quality and environment-friendly strategies in their operations, however, a key question is whether TQM system in organizations support or hinder CGP? The limited literature related to this topic provides contradictory findings in relation to this question. Zeng et al. (2017) said that TQM practices enhance organizational green innovation capabilities. However, Li et al. (2018) found a contradictory relationship between the two variables in Chinese manufacturing industries. Moreover, the literature provides scarce studies which exclusively investigate the relationship between TQM and CGP, particularly in Pakistan. Therefore, the following hypothesis is proposed.

H₀₁: Total quality management has a negative impact on corporate green performance.

To investigate this relationship in detail following sub-hypotheses are also proposed.

H_{01a}: Total quality management has a negative impact on corporate green management performance

H_{01b}: Total quality management has a negative impact on corporate green process performance

H_{01c}: Total quality management has a negative impact on corporate green product performance

2.4. Corporate social responsibility

CSR is an organizational green strategy which aims to preserve the cultural, social and economic aspects of the environment in which a firm operates (Raimi, 2017). The concept of CSR received valuable attention during the last decade, and its significance in the corporate sector is increasing on a continual basis (Hou, 2019). CSR activities depend on a number of factors, such as economic condition, laws and regulations, organizational culture and behaviour and market competition level (Campbell, 2018). CSR practices significantly enhance organizational capabilities to take competitive advantage and achieve sustainable growth objectives (Gorski, 2017). Such initiatives not only enhance firms' reputation, but also increase customers' loyalty and employees' satisfaction (Asrar-ul-Haq et al., 2017).

According to Awan et al. (2017), the participation of manufacturing firms in social development programs and considering their operations' impact on the environment not only leads to enhanced market share, but also reduces emissions, waste and pollution, and energy saving. For this reason, ecologists and different stakeholders have advised manufacturing businesses to integrate CSR and green management approaches into their operations (Yu and Huo, 2019). Turker (2009) proposed a CSR framework by considering stakeholders and categorized CSR activities into four groups, namely CSR to stakeholders, CSR to employees, CSR to customer/consumer and CSR to government. Maignan and Ferrell (2000) also divided CSR activities into four categories, namely economic, legal, ethical and discretionary citizenship. The current study considers three dimensions of CSR, namely CSR to the community, CSR to employees and CSR to customers.

- CSR to community refers to organizational initiatives for the development of society, such as financial support to NGOs and educational institutions, maintenance of city and region, promotion of culture and related activities for the well-being of the society.

- CSR to customers represents firms' responsibilities towards its customers, such as designing products as per customers need and offering it at a reasonable price, giving the right information to customers, ensuring customers' satisfaction through quality product and service, respecting customers complains and ensuring prompt solutions.
- CSR to employees refers to respecting workers' needs, such as ensuring the healthy and safe working environment, offering valuable wage package, professional and personal life balance, employees' empowerment and development through education and training and respecting workers' views.

A number of studies have mentioned that CSR activities facilitate firms to obtain a competitive advantage, protect the natural environment and achieve sustainable growth. For instance, Malik and Kanwal (2018) investigated the impact of CSR disclosure on the financial performance of pharmaceutical firms in Pakistan and found a positive relationship between them. Shahzad et al. (2019) examined the link between CSR and corporate sustainable performance in Asian countries and said that socially responsible organizations experience better sustainable performance than others. However, Martinez-Conesa et al. (2017) found a negative relationship between CSR activities and firms financial performance. Similarly, Mehralian et al. (2016) also identified an insignificant relationship between CSR activities and organizational financial performance in Iranian pharmaceutical industries.

Makhdoom and Anjum (2016) analysed the underlying relationship between TQM and CSR and concluded that both constructs are related to each other and positively impact on workers' and firms performance. According to Sarvaiya et al. (2018) HRM (one of the components of TQM) and CSR are linked to each other as HRM provides operational support to CSR. However, Río-Rama et al. (2017) found an insignificant relationship between the two variables. They conducted dimensional analysis between TQM practices and CSR using the European Foundation for Quality Management (EFQM) model in Spanish organizations and, with the exception of process management, found an insignificant relationship between all practices.

The concept of CSR in the Asian region is relatively less popular and in the initial levels of adoption. Moreover, in developing countries, such as Pakistan, most businesses regard CSR as a philanthropic activity instead of environmental and social development activity. Considering the above discussion, the following hypotheses are proposed:

H₀₂: Total quality management has a negative impact on corporate social responsibility activities.

H₀₃: Corporate social responsibility activities have a negative impact on corporate green performance.

To test the mediation effect, the following hypothesis is proposed:

H₀₄: Corporate social responsibility activities do not mediate the relationship between total quality management and corporate green performance.

3. Methodology

3.1. Target population and sampling procedure

The target population for the present research includes medium and large-sized manufacturing firms registered with the Securities and Exchange Commission of Pakistan (SECP). SECP is the largest

and most comprehensive directory of firms operating in Pakistan. The researcher approached only those firms which are ISO 9001 certified and are having or have applied or intend to apply for ISO 14001 and 26000 certificates. Following a non-probability convenience sampling technique, the data was collected from firms located in five major business cities in Pakistan, namely Karachi, Lahore, Islamabad, Sialkot and Faisalabad during April 2018 to July 2018 through personal visits as well as through electronic correspondence. The researcher obtained data from lower, middle, and upper-level management staff, as they have accurate information about organizational policy and practices. Moreover, they also are the key persons who share information and implement organizational policies in their departments. In response to 679 distributed questionnaires, the researcher received 291 usable responses. A total of 152 (52.58%) responses were received from medium-sized firms and 139 (47.77%) from large firms. Detailed demographic information is presented in Table 1. Fig. 1 describes how the researcher has examined the relationship between TQM, CGP, and CSR.

3.2. The measurement instrument

The current study's instrument was divided into three sections. In the first section, thirty-six items related to the six dimensions of the MBNQA model for TQM were placed. Leadership, process management and information and analysis were measured through five items for each, strategic planning was measured through six items, customer focus through seven items and HRM through eight items. For the first section, the items were taken from Saraph et al. (1989), Kaynak (2003), Prajogo and Sohal (2006) and Fuentes et al. (2006). In the second section, sixteen items related to the three aspects of CGP were placed. Green process and green product performance were measured through five items for each, and green management was measured through six items. The items for this section were extracted from Amores-Salvadó et al. (2014), Wong (2013), Kam-sing Wong (2012) and Frondel et al. (2007). The last section of the instrument was related to CSR and contained fifteen items. CSR to the community was measured through four items, CSR to customers was measured through five items, and six items were used to measure CSR to employees. The items for this section were taken from Turker (2009) and Maignan and Ferrell (2000). To evaluate the items, the researcher used a five-point Likert scale, where one symbolized strongly disagree and seven indicated strongly agree. Following Hinkin (1998) recommendation, the researcher performed a pilot study so that the reliability and validity of the adopted items could be ensured within the context of Pakistan. The researcher collected data from 30 organizations located in Lahore. The initial analysis indicated values of 0.82–0.97 for the internal consistency of the constructs, which adequately

fulfills Hair et al.'s, (2010) requirement of a minimum value of 0.7. Taking into account the outcomes of the pilot study, the researcher started a comprehensive survey.

3.3. Description of control variable

Following Ooi (2014) recommendation, the researcher took organizational size as the control variable as large organizations possess more resources and infrastructure than small firms. Considering Hoang et al. (2006) recommendation, the researcher divided organizations into medium and large groups by considering their number of employees. Organizations with less than two hundred employees were considered as the medium, while firms with more than two hundred employees were taken as large organizations.

3.4. Analysis of data

The researcher followed the SEM technique to examine the relationship between TQM, CGP and CSR. For this purpose, the researcher used SPSS v.23 and AMOS v.23. According to Prajogo and Cooper (2010), the SEM technique has the strength to remove the biases effect, which is caused by measurement errors, and build latent constructs' hierarchy. The researcher examined the adequacy of the sample through the Kaiser-Meyer-Olkin test, which showed a value of 0.923. This value fully meets Kaiser and Rice (1974) minimum requirement of 0.6. The multicollinearity factor was analysed through the variance inflation factor (VIF), which showed a value of 2.251. This value fully complied with Hair et al. (2010) requirement of less than 4, indicating the non-existence of multicollinearity. According to Schwarz et al. (2017), common method bias (CMB) is a critical concern in quantitative studies. The researcher analysed CMB through Harman's test of a single factor. The result for the single factor contribution was 39.43%. According to Podsakoff et al. (2012), if a single factor contributes less than 50% of the whole variance, CMB does not influence the results; therefore, it can be said that there is no any problem of CMB in the data.

3.5. Assessment of the measurement and structural model

The measurement model analyses the relationship between latent variables and their determinants and is tested through confirmatory factor analysis (CFA). CFA also ensures the unidimensionality and validity of the measurement model (Hinkin, 1998). The Cronbach's alpha value of the measurement model is 0.903, which fully complies with Peterson (1994) minimum requirement of 0.8. Therefore, it can confidently be said that the measurement possesses adequate reliability. Furthermore, the researcher analysed the convergent and discriminant validity. According to Awang (2012), convergent validity can be analysed through factor loading and, for already established items, the ideal loading is above 0.6. Moreover, Molina et al. (2007) recommended that the minimum value of the average variance extracted (AVE) for all constructs should be higher than 0.5. Table-2 provides details about the number of items along with their loading, composite reliability and AVE values.

To ensure that all constructs are empirically different from each other, the discriminant validity test was performed. For discriminant validity, Fornell and Larcker (1981) proposed that the variance of the constructs with its indicators should be higher than other constructs. Another indicator of discriminant validity is that the square root values of AVE have a higher correlation between the pair indicators. In the view of Hair et al. (2010), the correlation between the predictor variable's pair should not be higher than 0.9. The results are given in Table-3 clearly indicate that all the

Table 1
Demographic profile of respondents.

| Particulars | Description | Values | Percentage |
|---------------------|------------------------|--------|------------|
| Total Responses | Medium | 152 | 52.23% |
| | Large | 139 | 47.77% |
| Gender | Male | 159 | 54.64% |
| | Female | 123 | 42.27% |
| | Prefer not to disclose | 9 | 3.09% |
| | | | |
| Job Position | Lower management | 148 | 50.86% |
| | Middle management | 121 | 41.58% |
| | Upper management | 22 | 7.56% |
| Years of Experience | Less than 6 years | 73 | 25.09% |
| | 6–10 years | 138 | 47.42% |
| | 11–15 Years | 69 | 23.71% |
| | More than 15 | 11 | 3.78% |

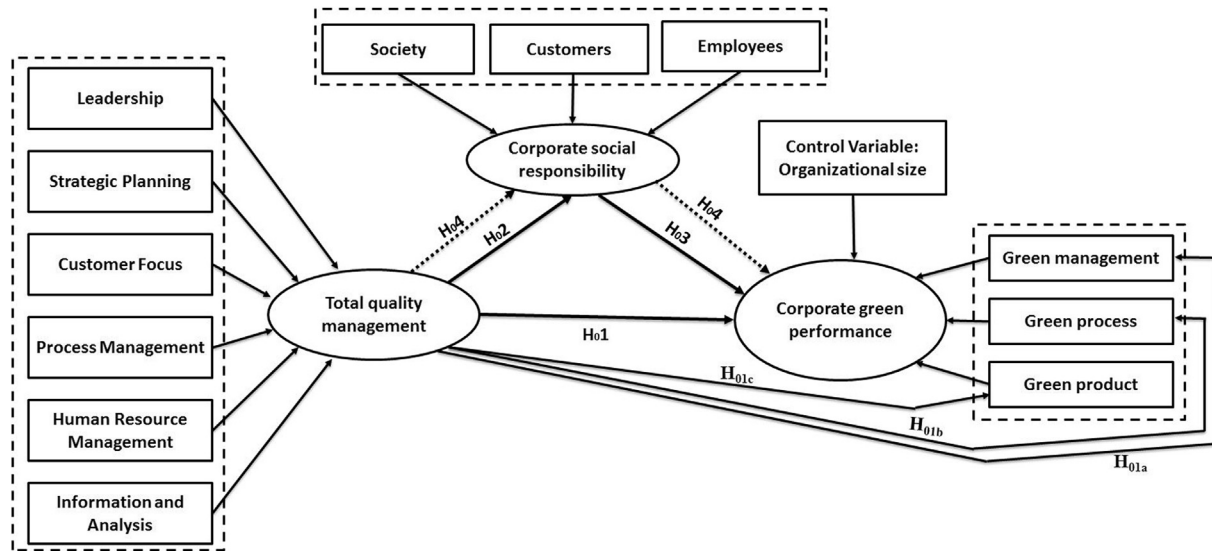


Fig. 1. Research framework.

Table 2
Instrument reliability and validity.

| Construct | Items | Factor Loading Ranges | Composite Reliability ¹ | AVE ² |
|---------------------------|-------|-----------------------|------------------------------------|------------------|
| Leadership | 5 | 0.775–0.883 | 0.873 | 0.673 |
| Strategic planning | 6 | 0.723–0.878 | 0.760 | 0.624 |
| Customer focus | 7 | 0.692–0.920 | 0.827 | 0.612 |
| Process management | 5 | 0.712–0.906 | 0.788 | 0.622 |
| Human resource management | 8 | 0.688–0.932 | 0.753 | 0.653 |
| Information & analysis | 5 | 0.715–0.911 | 0.821 | 0.568 |
| Green management | 6 | 0.681–0.889 | 0.793 | 0.622 |
| Green process | 5 | 0.713–0.932 | 0.853 | 0.551 |
| Green product | 5 | 0.691–0.894 | 0.833 | 0.612 |
| Community | 4 | 0.694–0.945 | 0.851 | 0.591 |
| Customers | 5 | 0.733–0.915 | 0.772 | 0.694 |
| Employees | 6 | 0.702–0.919 | 0.791 | 0.623 |

¹ The value of composite reliability should be ≥ 0.7 (Molina et al., 2007).

² Average variance extracted (AVE) value should be ≥ 0.5 (Molina et al., 2007).

Table 3
Discriminant validity analysis.

| Construct | LD | SP | CF | PM | HRM | IA | GM | GPC | GPD | CMT | CUS | EMP |
|-----------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| LD | 0.820 | | | | | | | | | | | |
| SP | 0.469 | 0.790 | | | | | | | | | | |
| CF | 0.512 | 0.468 | 0.782 | | | | | | | | | |
| PM | 0.534 | 0.448 | 0.531 | 0.789 | | | | | | | | |
| HRM | 0.471 | 0.556 | 0.478 | 0.523 | 0.808 | | | | | | | |
| IA | 0.453 | 0.476 | 0.554 | 0.553 | 0.566 | 0.754 | | | | | | |
| GM | 0.467 | 0.546 | 0.589 | 0.465 | 0.523 | 0.532 | 0.742 | | | | | |
| GPC | 0.493 | 0.558 | 0.508 | 0.575 | 0.467 | 0.443 | 0.578 | 0.782 | | | | |
| GPD | 0.535 | 0.575 | 0.522 | 0.498 | 0.556 | 0.456 | 0.533 | 0.476 | 0.789 | | | |
| CMT | 0.436 | 0.589 | 0.621 | 0.549 | 0.541 | 0.533 | 0.467 | 0.521 | 0.595 | 0.769 | | |
| CUS | 0.585 | 0.503 | 0.468 | 0.551 | 0.467 | 0.496 | 0.633 | 0.543 | 0.444 | 0.451 | 0.833 | |
| EMP | 0.611 | 0.624 | 0.533 | 0.623 | 0.499 | 0.476 | 0.490 | 0.468 | 0.475 | 0.489 | 0.543 | 0.789 |

LD = Leadership, SP = Strategic planning, CF = Customer focus, PM = Process management, HRM = Human resource management, IA = Information & analysis, GM = Green management, GPC = Green process, GPD = Green product, CMT = CSR to community, CUS = CSR to customers, EMP = CSR to employees.

requirements of discriminant validity recommended by Hair et al. (2010) and Fornell and Larcker (1981) have been met, and the constructs have adequate discriminant validity.

According to Kaynak (2003), there are seven indicators that determine the goodness of fit of the measurement model, namely chi-square to degree of freedom (χ^2/DF), goodness of fit index (GFI), adjusted goodness of fit index (AGFI), normative fit index (NFI),

comparative fit index (CFI), root mean square error of approximation (RMSEA) and standardized root mean squared residual (SRMR). The researcher also included the Tucker-Lewis index (TLI) so that the measurement and structural model's fitness could further be ensured. The findings of the measurement model indicate that the χ^2/DF value is 1.091, which is significantly below 2 as recommended by Byrne (1989) and also fulfils Bagozzi and Yi

Table 4
Analysis of measurement and structural model.

| The goodness of fit measures | CMIN/DF | NFI | GFI | AGFI | CFI | TLI | RMSEA | SRMR |
|------------------------------|-----------------|-------------------|-------------------|-------------------|-------------------|-------------------|--------------------|--------------------|
| Recommended value | ≤3 ^a | ≥0.9 ^b | ≥0.9 ^b | ≥0.9 ^b | ≥0.9 ^b | ≥0.9 ^b | ≤0.08 ^c | ≤0.08 ^d |
| Measurement Model | 1.091 | 0.915 | 0.923 | 0.911 | 0.901 | 0.938 | 0.029 | 0.0401 |
| Structural Model | 1.162 | 0.922 | 0.941 | 0.938 | 0.932 | 0.952 | 0.033 | 0.0317 |

^a (Bagozzi and Yi, 1988).

^b (Bagozzi and Yi, 1988; Bentler and Bonett, 1980; Byrne, 1989; McDonald and Marsh, 1990).

^c (Browne and Cudeck, 1992).

^d (Hu and Bentler, 1998).

(1988) requirement of less than 3. The analysis of other fit indices, such as NFI, CFI, GFI, AGFI, and TLI, also indicates that their values are well above the ideal value of 0.9 recommended by McDonald and Marsh (1990), Bagozzi and Yi (1988), Bentler and Bonett (1980) and Byrne (1989). The RMSEA value is 0.029, which is well below the maximum value of 0.08 determined by Browne and Cudeck (1992). Finally, the SRMR value is 0.0401, which also complies with the 0.1 cut-off limit by Hu and Bentler (1998).

After the assessment of the measurement model, the structural model was analysed and the results indicated a χ^2/DF value of 1.162. Moreover, the values of other fit indices, such as NFI, CFI, GFI, AGFI, and TLI are also above the value of 0.9 recommended by McDonald and Marsh (1990) and Bagozzi and Yi (1988). The RMSEA value is 0.033, which is well below the maximum value of 0.08 recommended by Browne and Cudeck (1992). Finally, the SRMR value of the structural model is 0.0317 and complies with Hu and Bentler (1998) requirement of less than 0.1 (see Table-4 for further details). On the basis of these results, it can be said that the measurement and structural models perfectly fit the collected data.

4. Results and discussion

The present research aims to investigate the impact of TQM on CGP through the mediating role of CSR. The researcher collected data from junior, middle, and senior managers of the medium and large manufacturing organizations located in five major business cities in Pakistan. The researcher analysed hypotheses through SEM. The analysis of data indicated that TQM has a significant impact on CGP with β and p-values of 0.259 and 0.003, respectively; hence, H₀₁ is rejected (see Table-5 and Fig. 2 for details). The dimensional level analysis also indicated a significant impact of TQM on three dimensions of CGP, namely corporate green

management, green process and green product performance. Therefore, the sub-hypotheses H_{01a}, H_{01b} and H_{01c} also stand rejected. This finding relates to the study of Kenneth et al. (2019) in which they identified the significant impact of TQM on corporate green management in the supply chain context. However, this result contradicts to Li et al. (2018) study where they identified a negative relationship between TQM and corporate green innovation in Chinese manufacturing firms. Considering the philosophy of continuous improvement and customer focus of TQM, firms generally adopt quality management practices to improve the performance of existing products and services with the objective to satisfy the demands of customers and stakeholders. Since in TQM system the whole process is nearly under control to avoid deviation and defects, this system can hinder firms to innovate (Li et al., 2018). Considering the present study's result, it can be said that the sampled firms are efficiently capitalizing on TQM which is enabling them to improve their GP.

The successful implementation of TQM and achievement of CGP objectives depends on a number of related factors, such as leadership commitment, infrastructure, technical know-how and capitalizing on the latest technology, which could be a major reason for the positive association between TQM and CGP. According to Li et al. (2018), the integration of the latest technology with TQM enables organizations to transform their traditional operations into green operations. Through TQM firms enhance their workers' knowledge and skills about the efficient utilization of resources. Under such an environment employees become more motivated to make sure that their products not only contain superior quality, but also protect the natural environment. The findings of this study indicate that if an organization can efficiently manage its TQM activities, it will boost the workers' skills, capabilities and motivation level to use the resources in efficient manners, resulting in enhanced CGP.

Table 5
Results of hypothesis testing.

| Hypothesis | Constructs | Estimate | Critical ratio | p-Value | Result | Hypothesis Decision |
|-----------------------|-------------------|----------|----------------|---------|---------------|---------------------|
| H ₀₁ | TQM → CGP | 0.259 | 2.937 | 0.003* | Significant | Rejected |
| H _{01a} | TQM → GMP | 0.204 | 2.594 | 0.011* | Significant | Rejected |
| H _{01b} | TQM → GPRCP | 0.164 | 2.141 | 0.023* | Significant | Rejected |
| H _{01c} | TQM → GPRDP | 0.202 | 2.419 | 0.014* | Significant | Rejected |
| H ₀₂ | TQM → CSR | 0.271 | 2.931 | 0.002* | Significant | Rejected |
| H ₀₃ | CSR → CGP | 0.189 | 2.125 | 0.018* | Significant | Rejected |
| Mediation | | | | | | |
| H ₀₄ | TQM → CGP | 0.192 | 2.792 | 0.017* | Significant | Rejected |
| | TQM → CSR | 0.211 | 2.815 | 0.004* | Significant | |
| | CSR → CGP | 0.183 | 2.201 | 0.011* | Significant | |
| Cont. variable | | | | | | |
| Org. size | Org. size → CGP | 0.136 | 0.525 | 0.519 | Insignificant | |
| | Org. size → GMP | 0.138 | 1.638 | 0.054 | Insignificant | |
| | Org. size → GPRCP | 0.127 | 1.402 | 0.697 | Insignificant | |
| | Org. size → GPRDP | 0.031 | 0.820 | 0.384 | Insignificant | |
| | Org. size → CSR | 0.141 | 1.892 | 0.031* | Significant | |

*p ≤ 0.05; **p ≤ 0.01; TQM = Total quality management; CGP= Corporate green performance; GMP = Green management performance; GPRCP = Green process performance; GPRDP = Green product performance; CSR= Corporate social responsibility; Org. Size = Organizational size.

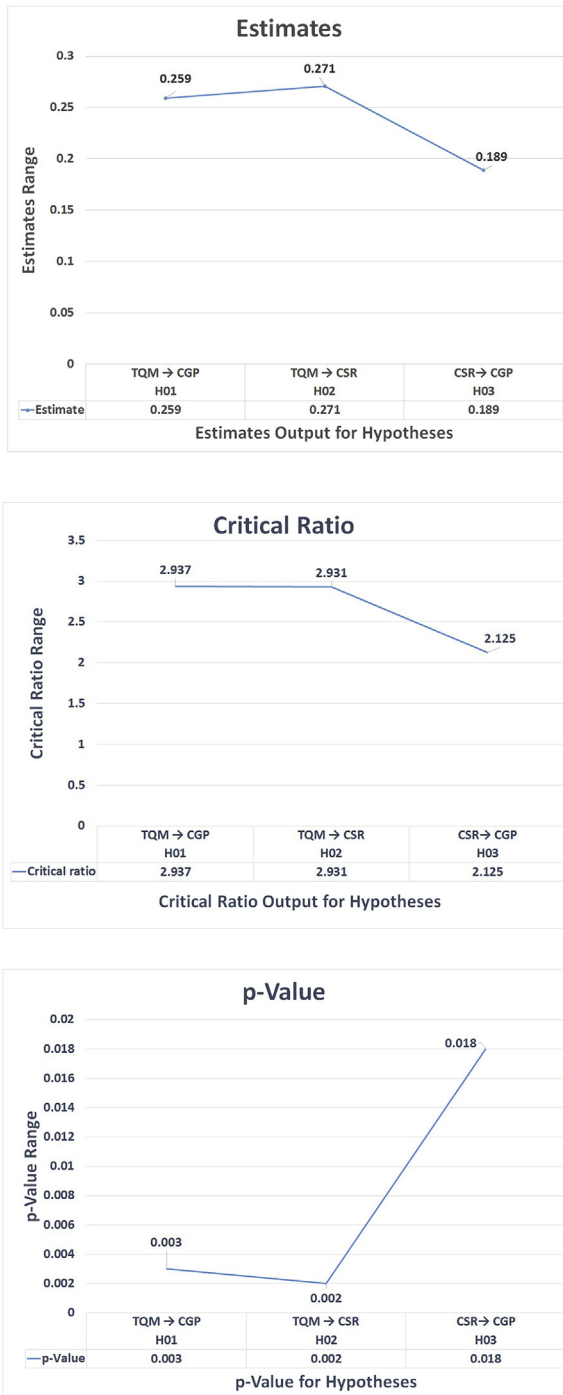


Fig. 2. Graphical presentation of SEM results.

TQM has also been shown to have a significant impact on CSR with a β -value of 0.271 and a p-value of 0.002; hence H_{02} is rejected. This finding is similar to the study of Kang et al. (2015), as a well-structured TQM program enhances organizational abilities for CSR activities. This result also supports the findings of Makhdoom and Anjum (2016) that TQM and CSR are positively related to each other. This significant result means that if an organization can manage its TQM activities in efficient manners, it will enhance its capabilities to participate in social development programs. This significant result indicates that the sampled firms are efficiency capitalizing on TQM program to achieve excellence in

CSR performance and TQM significantly boosting firms' capabilities to play its role in social development.

Another important finding of the current study is that CSR is positively related to CGP with β and p-values of 0.189 and 0.018, respectively; thus, H_{03} also stands rejected. The identification of this relationship matches with Shahzad et al. (2019) finding that CSR positively impacts on the sustainable performance of manufacturing firms in Asia. However, it contradicts with Mehralian et al. (2016) study where they mentioned an insignificant relationship between CSR and corporate performance. This positive result indicates that the management of the sampled firms is efficiently capitalizing on CSR to enhance CGP. In traditional organizations, CSR is considered as a philanthropic activity and a kind of financial burden, while dynamic organizations take CSR as an investment with long-term benefits. It can be concluded that the leadership of the studied organizations realizes the importance of CSR with respect to tangible and intangible benefits associated with it to enhance corporate sustainability and GP.

To investigate the mediation effect, the researcher followed Awang (2016) recommendations (direct and indirect effect). The direct impact of TQM on CGP indicated significant values with a β -value of 0.259 and a p-value of 0.003. The addition of CSR as a mediating variable reduced TQM's impact on CGP to a β -value of 0.192 and a p-value of 0.017. According to Awang (2016), the β -value is reduced because a portion of the effect is transferred through CSR. As the indirect effect is still significant, it can be said that CSR partially mediates the relationship between TQM and CGP, therefore H_{04} is rejected. This partial mediation means CSR accounts for some of the relationships between TQM and CGP (Baron and Kenny, 1986). Taking into account the contextual effect, the researcher divided the sampled firms into medium and large organizations by considering their number of employees. The inclusion of firm size as a control variable indicated an insignificant result for CGP. This means that it is TQM, and not organizational size, which influences the level of CGP. However, organizational size indicated a significant result for CSR. This indicates that the volume of CSR activities varies from medium to large-size firms. Large-size firms normally contain more resources than small and medium-size, which could be one of the reasons for this significant result.

5. Research implications, limitations, and conclusion

5.1. Research implications and limitations

The present study has a number of practical and theoretical implications. From the industrial perspective, the results highlight the significance of institutionalizing TQM in the manufacturing industries to achieve green performance objectives. This study also highlights the important role of CSR in achieving CGP objectives and explains how firms can achieve excellence in operations leading to strategic advantage by integrating TQM and CSR practices. The structural analysis indicates that CGP is significantly linked with the effective implementation of TQM program and CSR activities. Firms which are committed with quality management practices in their operations and actively participate in social development programs are likely to outperform than the traditional ones. For this reason, to achieve CGP objectives, firms should ensure the implementation of TQM in its true spirit by adopting any quality program, such as MBNQA, EFQM, Kaizen etc. and regard the significance of CSR.

The present research also explains that TQM is as important for large as well as medium firms, meaning that regardless of firm size, if medium firm implements TQM in an efficient manner, it is likely that it will facilitate the achievement of CGP objectives. Therefore, this study provides confidence to the managers of medium-sized

firms that they can reap similar benefits from TQM to those being achieved by large firms. The current study also presents the evidence that the constructive effects of TQM are not only limited to the firms operating in the developed countries. If the organizations in the under-developed or developing countries apply TQM practices in an efficient manner; similar results can be achieved there as well.

From the theoretical viewpoint, the current research enriches the available literature on TQM, CSR and CGP in a number of manners. First, this study bridges the literature gap in the relationship between TQM and CGP, particularly in manufacturing firms located in Pakistan. This study also supports the TQM proponents' arguments that the implementation of TQM in an efficient manner can significantly boost organizational performance. Secondly, this research validates the CGP model based on green theory and MBNQA model and investigates the robustness of the conceptual model through SEM, which has rarely been performed in the previous studies. Thirdly, this study indicates the role of CSR which partially mediates the relationship between TQM and CGP, which also has never been evaluated earlier.

Similar to other researches, the present study also has some limitations. The data for this research was collected by requesting the managers to operationalize the study instrument on the basis of their organization's actual performance; hence, the collected responses are based on managers' perceptions, which may have caused bias in the data. Although, the researcher has analysed the reliability and validity, the effect of biases cannot be fully ruled out. Therefore, along with individual personal perception, the hard data of the organizations, such as annual financial reports, can also provide additional evidence regarding the relationship between TQM, CSR and CGP. Secondly, the data was only collected from lower, middle, and upper-level managers, and ignored operational staff; however, their opinion can give further insights. Therefore, in the future, researchers can include them to further explore these variables. The researcher only collected data from manufacturing organizations located in Lahore, Karachi, Islamabad, Sialkot and Faisalabad cities in Pakistan. It is recommended that the region of the study should be expanded to include other cities and countries.

5.2. Conclusion

Considering the environmental issues mainly caused by the

manufacturing firms, the importance of green growth for achieving sustainability has increased a lot. Green growth has special importance for developing countries, such as Pakistan, where most manufacturing firms rely on fossil energy. The government of Pakistan has made a huge investment to promote green business practices in recent years. In the current study, the researcher analysed the role of TQM in CGP and investigated how CSR mediates the relationship between the two variables. Based on the green theory, MBNQA model and fundamental arguments developed on the basis of existing literature, the researcher established four hypotheses which have been tested through SEM. The results indicate that TQM significantly impacts on CGP and has great potential to boost green business practices. Moreover, CSR partially mediates the relationship between TQM and CGP. The constructive results of TQM in CGP with the help of CSR in Pakistani companies indicate that if firms implement TQM practices in their true spirit, even in developing countries, it will boost CGP. However, to achieve green business objectives, the government and top management commitment are imperative.

Declaration of interest

The author declares no conflict of interest.

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APPENDIX

Leadership

- The top management of my company is strongly committed to the culture of change
- The top management of my company is dedicated to quality improvement and learning
- The top management of my company allocate sufficient resources for products and service quality improvement
- The top management strongly encourage the employees to share their views and try new things
- The top management regularly share the organization vision with employees and ensures the unity among departments to achieve excellence

Strategic Planning

- My organization has a clear vision and mission statements which are supported by all employees
- The top management of my company regularly sets and reviews short and long-term goals for managers
- The management provides adequate resources and support to achieve short and long-term objectives
- The policies and plans of my company consider employees', customers', and other stakeholders' needs
- The strategies and plans of my company are focused on quality improvement
- Our office's operations are effectively aligned with mission and vision statements

Customer Focus

- My organization design products and services by considering the customers' requirements
- We regularly provide information about our new products and services to our customer
- My organization regularly takes feedback from customers about their experiences and expectations to measure their satisfaction
- The information about customers' experience and expectations is widely used by the management to improve the products and services
- Managers and executives support the employees' initiatives to improve customers' satisfaction
- We are keen to resolve customers complaints and have an effective mechanism for it
- My organization keeps a strong relationship with customers by providing them with an easy channel for communication

Process Management

- We have standardized operational processes which are clear and well understood by employees and customers

(continued on next page)

(continued)

- Most of the processes in our organization are automated, fool-proof, and minimizes human error chances
- We have the latest technology and equipment to serve our customers more effectively and efficiently
- Our system allows us to inspect and track key processes that are critical to the organization
- We regularly evaluate and improve our business processes to ensure quality

Human Resource Management

- The management gives high value to recruitment and selection standards
- My organization regularly arranges training and development sessions for its employees
- We have effective work recognition and reward system to motivate the employees
- The management of my company regularly takes employees' views and consider them to improve product and service quality
- We have effective top-to-bottom and bottom-to-top communication process
- Quality is taken as their responsibility by all employees
- My company treats its employees as assets and regularly measure their satisfaction level
- The management of my company is concerned about the well-being of its employees (health, medical and security) and provide financial support to them

Information & Analysis

- We have effective information and reporting system for all products and services
- The management regularly provides quality data (errors, complains, defects etc.) to the workers
- Workers, supervisors, and managers can easily retrieve information about different products and services
- The top management uses quality data to make decisions and plans
- All departments coordinate with each other to implement and monitor quality improvement programs

Green Management

- The management of my organization is highly committed to following environment-friendly policies
- We regularly review and redesign our strategies to ensure its compliance with environmental criteria
- Our organization is open to adopting new or improve existing management system with respect to policies and practices
- The management ensures the availability of infrastructure to improve the operational processes
- Our management ensures that our production and operation activities are environment-friendly
- The management of our organization takes initiatives to raise awareness about the environmental issues and impacts of business operations

Green Product

- Our products use the least or zero amount of toxic material
- Our products use clean or recyclable material
- We offer our products in environment-friendly designs to improve the energy efficiency
- Our products are offered in biodegradable packing to minimize its environmental impact
- When designing new products, we take recycling and disposal at the end of life into account.

Green Process

- Our production processes consume the least amount of resources, such as water, electricity gas
- We use environment-friendly or clean technology in our production processes to prevent pollution
- Our production processes focus on using clean and recyclable material
- We redesign our production and operation processes to improve environmental efficiency
- We redesign and improve our products or services to meet new environmental criteria or directives

CSR to Community.

- My organization regularly participates in the social development program
- My organization regularly provides financial and non-financial support to firms working for the well-being of the society
- My organization provides financial and non-financial support to educational institutions for students learning and development
- My organization encourage its employees to participate in social development activities

CSR to Customers.

- Our organization gives the highest importance to customer satisfaction
- We provide complete and accurate information about our products and services to our customers
- We offer high quality of products and services to our customers
- Our company is responsive to the complaints of its customers
- Our company respects consumer rights beyond the legal requirements.

CSR to Employees.

- My company provides a safe and healthy working environment to all its employees
- My company offers a competitive salary to its employees
- My company provides financial support to workers willing to acquire additional education
- My company provides equal opportunities to all its employees

- My company facilitate the employees to develop their skills and careers
- My company provides a number of benefits to the employees to improve their quality of lives

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