

# Impact of Total Quality Management on Environmental Performance as the mediating role of Green Manufacturing Practices and Ambidextrous Green Innovation

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**Abstract:** The aim of this study is to analyze the relationship between total quality management (TQM), environmental performance (EP), with the mediating role of green manufacturing practices (GMPs), and ambidextrous green innovation (AGI). This study investigates different aspects of TQM and find similarities with GMPs. RBV and natural RBV define the organizations performance and competitive edge. This conceptual study contributes in literature by adding new variable AGI in the framework of TQM, GMPs, and EP. Future researchers can hld empirical study by adding new variables in the framework to provide more indepth explanation.

**Keywords:** Total quality management, Green manufacturing practices, Ambidextrous green innovation, Environmental performance, Resource based view

## 1. Introduction

Total quality management (TQM) is business methodology, the objective of TQM is to improve production, stakeholder value, sales, and customer satisfaction through constantly improving day to day operations [1]. TQM has increased its influence over organizational frameworks and conventional limits [1]. Pervious study showed TQM prioritize policies aimed to environmental and social responsibility [2]. The main objective is to minimize the waste in environment and TQM provides basis to the corporate practices for waste reduction [3]. Previous studies identified importance of different improvement approaches TQM, GMPs for environmental performance [1].

As world is developing rapidly the manufacturing sector of developed countries had imposed primary concerns about resource prevention and environmental decline [1]. Previous study showed emerging economies are incapable in tackling this problem sufficiently due to absence of recognized environmental business strategies [4]. Although, customer consciousness increased for environment [4]. Due to increased customer consciousness for environment companies are facing pressure to implement green manufacturing practices (GMPs) to reduce the environmental impact [1].

Manufacturing firms promote execution of GMPs through employment of TQM to meet customer consciousness about ecofriendly and sustainable production process [1]. Here, TQM aims to constant objectives; firms maintain cost effectiveness and enhance efficiency [1]. Empirically, previous studies verified a strong relationship between TQM and GMPs [5][6]. TQM and GMPs are becoming more significant for emerging economies [7]. The previous study also elaborated the role of the TQM and GMPs on EP [1]. However, EP has been elaborated in other aspects like ambidextrous green innovation AGI [8]. Companies follow manipulative and tentative GI to deal with different environmental challenges effectively [8].

## 2. Literature Review

## *2.1 Theoretical Background*

Resource-based view (RBV), which holds that an organization's competitive advantage is mainly determined by its resources and capabilities [9]. According to the natural RBV, which is an addition in RBV, environmental problems must be resolved in order to gain a competitive edge [10]. Despite its advantages, the RBV concept is deficient in certain important areas [1]. The relationship that take place between an organization and its surrounding environment is not taken into consideration [1]. Formerly, the elimination would have been acceptable, but contemporary theory emphasizes how crucial the environment is to gaining a competitive edge [1]. Using natural resources and competencies at the same time increase efficiency and reduces pollution [11]. Moreover, sustainability performance would be enhanced through effectiveness of organizational efforts, use of natural resources, and adopting pollution reduction techniques [1]. According to RBV structure does not amply quality management, GMPs, or success measures derived from environmental strategies [1]. TQM methods leadership, strategic planning, human resource management customer focus, process management, analysis and information is important to improve EP, based on natural RBV theory [1]. Therefore, GMPs and environmental plans must be established [1].

## *2.2 TQM and Environmental Performance*

In extend to environmental management, TQM inspires organizations to follow excellence in all features of their operations [13]. TQM methods leads to better EP through waste reduction, enhancing efficiency, effective resource utilization [1]. There is an orderly method to TQM to problem solving and process enhancement which leads to removal of processes that are damaging the environment [14]. For increasing claim in environmental sustainability, TQM focuses on importance of stakeholder satisfaction line up with organizational objectives [1]. TQM raise culture of an organization to become environmentally responsible also it leads to enhance EP [15]. Firms are facing important questions about usage of resources, produced products, and the waste of their daily operations since natural resources converted into mutual parts of business [1]. The importance of these issues are directly connected to the quality of techniques used [1]. Reputation and financial performance of an organization can be impact by low standard products [1]. Human labor and natural resources reduction causes to the negative impacts of substandard quality on the environment [16]. Furthermore, the organizations that have concerns for honesty and operational excellence may have chance to adopt state of the art items or techniques in response to changing business environment [1]. TQM encourages continuous improvement and orderly methods, which can lead to enhanced EP by join in eco-friendly practices at all levels of an organization [17]. TQM encourages the acceptance of sustainable practices that improve quality of product and environment by ranking customer satisfaction and reducing waste [1]. TQM improves company's capability to effectively manage and use human and natural resources [1]. According to study [18] EP is linked with TQM as both aims to optimize the use of resources. Businesses that focus on TQM also take responsibility of ecological concerns of their activities the give importance to issues that have performance impact [19][20]. Quality management and sustainability would be carefully combined [1]. TQM techniques can support organizations in developing new strategies to enhance EP which is widely recognized [1]. Therefore, we propose that

Proposition 1: TQM has significant positive impact on EP.

## *2.3 TQM and Green Manufacturing Practices*

Low productivity, high cost, and decreased efficiency are the result of negative environmental effect, companies of different sizes can implement GMPs rules to reduce environmental effects [1]. Without harming the environment, the production, use, and disposal of eco-friendly substances aim to GMPs [21][22]. Due to manufacturing techniques it is not possible to label a product completely 'green', so GMPs give significant importance to production processes that minimize, avoid, and refrain waste [1]. As mentioned above objective is important as it emphasizes the purpose of GMPs, which are to reduce waste in landfills and reserve natural resources [23]. Therefore, safety of environment

of workers are important role of GMPs, also improving the efficiency, competitiveness and profitability of the organization [1]. Total quality environmental management and green supply chain management are two main categorize of GMPs [24]. TQM and GMPs are classified as different entities but there in between there are some similarities [1]. According to [25] TQM and GMPs use many of the same methods. Environmentally friendly practices are divided into two categories by TQM and GPMs: tolerant and sever [1]. TQM programs have recently shown noticeable movement towards including more ecologically sustainable operations [26]. A proactive approach that emphasizes long-term goals, maintains outstanding performance, applies a zero-defect methodology, reduces waste, does life cycle assessments, offers training, and encourages employee involvement is encouraged by both philosophical stances [1]. AN organization's reputation, financial performance, and ability to maintain environmental performance can all be negatively impacted by the poor application of quality standards [1]. Furthermore, insufficient quality standards points to a poor application of GMPs, which wastes time, money, and natural resources [27]. Therefore, this supports the view that the implementation of TQM results in increased efficiency in the consumption of resources, particularly, natural resource [28]. The aim of TQM methods is to increase productivity, decrease waste, and improve the manufacturing process [29]. There are similarities in TQM and green manufacturing which aims to reduce environmental impact through sustainability practices, similar focus areas are customer satisfaction, continuous improvement, and process optimization [1]. TQM methods are useful to find and fix inefficacies in the manufacturing processes that decreases the production waste and resource consumption, therefore implementing TQM to improve quality [1]. This similarity facilitates the adoption of GMPs as firms aim to reduce their environmental footprints in line with their quality initiatives [1]. Therefore, TQM acts as a facilitator of GMPs that leads to sustainable operational fitness [30]. Therefore, we propose that

Proposition 2: TQM has significant positive impact on GMPs.

#### *2.4 Green Manufacturing Practices and Environmental Performance*

An organization's standing and reputation in the eye of public is important, GMPs are crucial to improve this image [1]. Studies show, in developing nations green manufacturing is becoming more significant and will significantly affect manufacturing enterprises in competitive environment [31][12]. It is discovered that in industrial sector of Brazil GMP improved resource efficiency and waste reduction [32]. Similarly, preserving raw materials, water, and energy for the firm supports GMPs [33]. Furthermore, GMPs made it easier to utilize the discarded and rejected goods with the help of reversed logistics [1]. Stakeholders of firms understand the importance of GMPs in preserving environmental initiatives, which has gained more importance for the consumers and governments [1]. In the study of Ghanaian SMEs [14] investigated relationship between GMPs and sustainable performance, with the mediating role of green supply chain practices. The researchers focused on the environmental, economic, and social aspects of sustainable performance [34]. Previous studies found that GMPs specific situation significantly affect the long-term performance, the relationship can be mitigated by employing green supply chain practices [1]. The use of sustainable manufacturing practices helped in long-term success of manufacturing firms in Malaysia [35]. GMPs allow manufacturers to effectively satisfy the stakeholder expectations through reducing their environmental impact [36]. As a result, firms changed themselves from competitors and customers gained benefits [1]. In everyday operations firms come to be more under pressure in implementing GMPs [1]. GMPs implementation improves firm's reputation, competitive edge through cost reduction and long-term investor attraction [37][6]. Indian petrochemical industry achieved environmental care when they implemented green manufacturing management practices [38]. Which results better success in terms of new products and processes [1]. GMPs improve business capacity to produce environmentally friendly ideas [1]. According to a study of green management facilities equally helpful for partnership between firm and environment [39]. This is accomplished by focusing on waste reduction and optimization of resources [1]. As a result, economy and earth benefited and preserved [1]. It is discovered that businesses which adopt environmentally friendly practices gained more success in the market [40]. It is revealed that adopting green practices in an organization improves internal fitness growth, performance, and learning [41]. GMPs reduce waste, pollutants, and energy use in

manufacturing processes which improves environmental performance [1]. Sustainable materials, technologies, and environment friendly practices results in reduction of pollution and resources preservation [1]. Therefore, for legal requirements and environmental objectives businesses that adopt green manufacturing can significantly reduce their environmental impact [13][42].

Proposition 3: GMPs have a significant positive impact on EP.

### *2.5 Green Manufacturing Practices, TQM, and Environmental Performance*

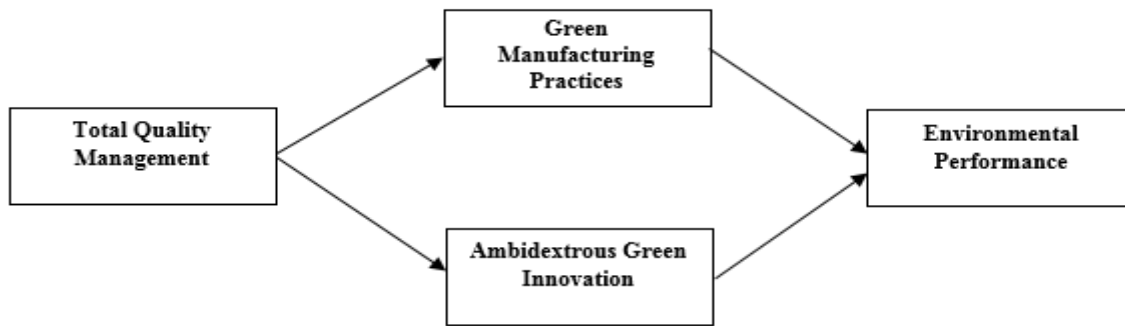
The aim of the study is to find proof to support the idea of GMPs in relationship between TQM and EP [1]. GMPs define the correct relationship between TQM and EP [21]. According to the theoretical research the adoption and implementation of TQM by firms results in improved EP [1]. Businesses aims to environmentally friendly practices for the use of efficient manufacturing methods to provide high quality products and services [43]. By using TQM firms can improve economic, social, and environmental performance [44]. It is important for successfully implement TQM and giving a firm competitive edge through developing helpful relations between supply chain participants [1]. According to RBV theory, TQM use processes and resources efficiently to improve sustainability performance [1]. A company can reserve its competitive edge by utilizing TQM [24]. A study investigated the relationship between TQM and business performance with the help of natural RBV model [45]. The result approved that TQM has an important influence [1]. Therefore, we propose that

Proposition 4: GMPs significantly mediate the relationship between TQM and EP.

### *2.6 Ambidextrous Green Innovation and Environmental Performance*

Previous studies showed green innovation helps organization to be successful and improve EP [38][46]. Studies showed that ambidextrous business that excels both investigative and unequal innovations are expected to perform better for the environment [47][24]. The ambidexterity theory's central understanding is that "firms that are contemporarily following exploitation and exploration are more expected to achieve better performance than the firms giving importance to one at the expense of other", is the source for the belief that ambidexterity can enhance EP [48]. Businesses that are focused on exploitation and making changes to their operations and processes for addressing environmental concerns [49]. However, the businesses that are focusing exploratory in nature improve their technology, adding new goods and services that have potential to improve EP [24]. An efficient synthesis of exploitation and exploration views these two organizational skills as complementary, with exploitation potentially fostering exploration and vice versa, with regard to a company that aims to improve environmental performance through both process improvement and product innovation [24] [50]. An ambidextrous business can effectively apply its expertise to both exploratory and exploitative environmental practices [8]. An organization's ability to successfully achieve improved environmental performance is dependent on its ambidextrousness because an adaptive business is expected to "exploit existing competencies and explore new ones and, more importantly, that these two facets of organizational learning are inseparable". Therefore, we propose that

Proposition 5: AGI has a significant impact on EP.



**Figure 1. Conceptual Framework**

### 3. Conclusion

This study aims to study the important role of total quality management (TQM) in environmental performance (EP). Green manufacturing practices (GMPs) and ambidextrous green innovation enhance the relationship of TQM and EP, GMPs and AGI are two mediating variables of this study. TQM approaches are used for continuous improvement and environmental concerns similarly GMPs also has some approaches that are matched with TQM. The integration of TQM and GMPs results in waste reduction, cost efficiency, and sustainability. AGI has different aspect, which focuses on balancing exploitative and exploratory practices to raise in technological advancement and operational efficiency to achieve EP. Several theories had been used in this study. RBV and its natural aspect provided the base to better understand the variables. Adding sustainable practices into the core business processes, organizations can improve environmental performance, enhance their public image, and achieve long-term operational success. This study has only conceptual view future researchers can explore its empirical side and also add new advanced sustainable manufacturing methods.

#### 3.1 Practical Implications

This study offers efficient environmental performance procedure to organizations and governments. This study aims to implement green manufacturing practices (GMPs) and total quality management (TQM) for continuous development. Sustained environmental and operational excellence requires balancing exploratory and exploitative green advances and creating defined environmental plans that are in line with company goals. The implementation of sustainable practices can be further maximized through supply chain cooperation and employee training. Especially in emerging economies where resource limitations and laws present difficulties, policymakers should encourage these initiatives with financial incentives and supportive regulations. When combined, these actions can help businesses reach global sustainability targets and become more competitive.

#### 3.2 Future Research Direction

This conceptual study has some limitations even though it makes a significant contribution to the body of literature already in existence. Since this is a conceptual study, no empirical data has been gathered or examined. This study can be used by future scholars to investigate its empirical aspects and look at its conceptual foundation. Future researchers should think about extending the model by adding new mediating and moderating variables, like green marketing, green transformational leadership, and green knowledge management, for a more comprehensive analysis. This would lead to a more sophisticated comprehension of the intricate relationships within the framework of corporate green initiatives.

**Data Availability:**

The datasets used in this study are available from the corresponding authors upon reasonable request.

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