South Asian Journal of Operations and Logistics
Vol. 3, No. 2, pp. 224-246
DOI: 10.57044/SAJOL.2024.3.2.2439
ISSN: 2958-2504

Impact of TQM on operational, logistical and quality performance with a moderating role of reverse supply chain

Noor Nawaz [1*]

[*1]*Faculty of Business Administration, Iqra University, Pakistan*

**Corresponding email: Noornawaz52714@iqra.edu.pk*

Article History

Received: 20 June 2023
Revised: 09 March 2024

JEL Classification
Q56
R41
G14

ABSTRACT

Many research studies established the significance of total quality management to organizational performance. However, most of the researchers focused on individual relationships. This research aims to examine an integrated model by analyzing the impact of total quality management on operational performance, logistics performance, and quality performance with moderation of revere supply chain in steel companies of Pakistan. The study used a quantitative research method to test the hypotheses by collecting data utilizing the survey questionnaire on a five-point Likert scale. For analysis, the study opted for IBM SPSS and SmartPLS as the appropriate statistical tools. This study confirms the significant relationship between total quality management and reverse supply chain. Furthermore, this study finds no significant relationship between comprehensive quality management and operational, logistics, and quality performance. The insignificance values show the lack of implementation of study variables in the study and the geological context.

Keywords: *Total quality management, TQM, Reverse logistics, Logistics performance, Operational performance, Quality performance, Supply chain management, Quantitative research*

Citation of this article:

Nawaz, N. (2024). Impact of TQM on operational, logistical and quality performance with a reverse supply chain moderating role. *South Asian Journal of Operations and Logistics, 3*(2), 224-246. https://doi.org/10.57044/SAJOL.2024.3.2.2439

Impact of TQM on operational, logistical and quality performance with a moderating role of reverse supply chain

1. Introduction

TQM theory was developed by Deming in 1991. Total Quality Management Theory is based on customer satisfaction (Arumugam et al., 2008). It is widely believed that rather than putting the whole responsibility on manufacturing quality, it can be generated and monitored when teams of various departments share responsibility for ensuring quality at different stages. Quality management is a comprehensive approach that includes every company function and is oriented towards continual improvement. Furthermore, it is also an approach towards organizational transformation (Kaynak, 2003; Kaynak & Hartley, 2007). Strategic approaches to management, like TQM, have been regarded as helpful in encouraging learning and improving organizations' competitive edge (Hung et al., 2011; Sahoo, 2018).

Total Quality Management is a philosophy towards the art of management that began in the industries of Japan. This philosophy originated in 1950 and has progressively gained popularity in Western countries since 1980. TQM refers to an organization's goal of providing a constant supply of goods and services that meet its customers' needs (Singh & Agrawal, 2018). According to a significant body of empirical research, adopting TQM increases quality performance. They were assessed in a variety of methods, and it was discovered that TQM implementation and specific strategies that improve performance Prajogo prediction varies around the whole world (Arumugam et al., 2008; Bowersox et al., 2007; Prajogo & Brown, 2004; Prajogo & Sohal, 2006). A study examined Jordan's oil and gas companies and concluded that total quality management positively impacts operations efficiency and organization performance. Implementation of Total quality management in organizations is needed to acquire a few internationally recognized quality credentials for creating a better image of the company with foreign customers, establish a feeling of the same purpose, team spirit, and common trust among every individual, as well as improve the feeling of belongingness to the work environment. Manufacturing organizations must know and understand the influence of complex product offers on business performance, such as quality, cost, time, and delivery. The company should calculate manufacturing process performance and identify operations efficiency in manufacturing as time, expense, quality and reliability measurements. Which are related to manufacturing firm’s operations (Trattner et al., 2019). Reverse supply chains deal with the backward flow of items that have been damaged or used. RSCs involve actions starting from collecting, inspecting products, and disposing and distributing collected products. Properly organized RSC can offer economic and environmental advantages (Fazlollahtabar, 2019).

1.1 Background of the Study

Markets are becoming increasingly competitive day by day compared to previous decades. With more vendors offering similar goods or services, the business environment is becoming more competitive, compelling firms to compete. Consequently, to achieve organizational success, organizations must react quickly, effectively, and efficiently to market developments (Senarath et al., 2020). Total quality management is widely practised by firms worldwide, including in Malaysia. Small and medium enterprises use the total quality management technique to gain a significant revenue increment, eventually leading to GDP growth (Pambreni et al., 2019). Total quality performance is used in organizations to bring quality to services, products, people, and processes to create long-term profitable organizations. They further mentioned that, in terms of total quality, customers have a driving seat and can guide the organizations on precisely what they should bring to be the customer's choice.

Further, they write that to gain a sustainable competitive edge over competitors' organizations, they use TQM." The TQM focuses on the quality of the products and services, continuous improvement from the organization's perspective, and employee participation to bring quality management into the organizational work setting. Working as a team and involving every team member can motivate employees to work efficiently, eventually leading to high organizational performance (Rashid et al.,

2023). Various empirical studies reveal that logistics is a strategic vector in a company's structure and impacts its performance, particularly regarding service quality and overall profitability. As Mentzer et al. (2001) and Fugate et al. (2012) point out, logistics impacts efficacy and profitability. Logistics management has become a powerful tool for gaining a competitive edge and boosting organizational performance (Baloch & Rashid, 2022; Li et al., 2008).

Markets provide a variety of options to consumers. Therefore, it has become crucial for today's businesses to offer fair value to consumers. Otherwise, customers can choose from other options provided by competitors. Therefore, in today's world, companies are targeting two main targets irrespective of industry, which gives productivity and value to their customers (Gupta & Singh, 2017; Hashmi, 2022). TQM adds value to the management of a company by improving efficiency. This results in the success of the company. The basis of the philosophy of TQM was to provide a system of enhancement that improved processes involved in manufacturing. When TQM was found to be successful in manufacturing, it incorporated this philosophy into managerial operations to improve the company's performance (Sweis et al., 2019). Both manufacturing and operational performance strategies are critically important for increasing productivity and making businesses successful.

1.2 Problem Statement

TQM implies a philosophy of management throughout the company. This focuses on continuous improvement and enhancement of the quality of processes and the company's products and services. Old literature in logistics shows that logistical performance may impact a company's performance (Hashmi et al., 2023). Furthermore, empirical findings also confirm the significance of logistical performance on a company's performance (Fugate et al., 2012). Large-scale manufacturing organizations have yet to be able to achieve their targeted level of operational efficiency during their peak season. Primary data suggests that poor quality, increased costs, and a lack of flexibility are significant reasons for failing to reach the targeted level of operational efficiency. The researcher aims to explore solutions to the performance gap. Limited research has been done on the impact of "TQM on operational performance in large-scale manufacturing organizations in Sri Lanka. Therefore, the relationship between TQM and operational performance has to be identified because it affects many. The impact of TQM on operational performance has been identified many times but in the context of other countries. Researchers have different opinions on the impact of TQM on operational performance. Some researchers recognize a positive and significant relationship between TQM and operational performance. On the other hand, some researchers recognize and argue that there is an insignificant and negative relationship between TQM and operational performance (Senarath et al., 2020).

This study aims to find solutions for the performance gap and also fill a theoretical gap by evaluating the influence of TQM practices on operational, logistical, and quality performance within the context of manufacturing companies in Pakistan. Further, the following research questions will seek answers by testing the study hypotheses:

1. *Do Total Quality Management activities influence operational performance in manufacturing companies in Pakistan?*
2. *Do Total Quality Management activities influence the logistical performance of manufacturing companies in Pakistan?*
3. *Do total quality management activities influence quality performance in manufacturing companies in Pakistan?*
4. *Do reverse supply chains mediate between TQM and operational, logistical, and operational performance?*

1.4 Importance and Significance of the Study

Companies should employ various ways to achieve a competitive edge with the rapid increase in competitiveness between businesses. A company's ability to compete depends on its ability to achieve operational performance. As a result, the study concludes that implementing overall quality

management practices is critical to achieving operational performance in a company. The significance of quality management has grown in the competitive international market environment; both performance and evaluation have become essential research subjects in the international market environment. The results of the study suggest that performance management in companies in which TQM practices are unavoidable because they lead companies to attain their business objectives; this research confirms that in the prevailing globalized business environment, large-scale manufacturing organizations with good operational performance have a significant competitive advantage (Senarath et al., 2020).

Logistics plays a vital role in global trade relations. Research studies show that logistics positively correlates with global trade through various analytical approaches. Some studies have linked logistics performance variations with global trade volumes by demonstrating a relationship between logistics indicators and global trade (Gani, 2017; Rashid et al., 2024a). A survey of four hundred twenty-five small and medium enterprises (SMEs) used structural equation modelling (SEM) to analyze the data. Results showed that Indian SMEs adopt fewer lean activities.

Furthermore, it was found that this limited adoption of lean activities positively influences operational performance. Wall (2021) researched the manufacturing and service industries in Thailand, and data was taken from five hundred twenty-five firms. Results showed differences between both industries concerning quality performance and total quality performance. It also suggests the implementation of TQM practices in both sectors.

2. Literature Review

2.1 Resource-Based Theory

The resource-based view suggests developing a company's strategy by focusing on achieving a competitive edge based on the company's resources. During the early 1980s and 1990s, this theory started developing. By adopting a resource-based view, companies seek competitive advantages from the inside environment rather than searching for competitive advantages from the external environment (Barney, 1991; Hashmi et al., 2021a). This resource-based strategy formulation theory develops a framework for organizational managers to look into their weaknesses and strengths to understand marketing issues that lead towards improving organizational performance (Hashmi et al., 2020a). Barney's model explains that competitive advantage resides in an organization's tangible and intangible resources, which must be heterogeneous, immobile, matchless, and non-substitutable (Hashmi et al., 2020b). Total quality management (TQM) can increase performance by motivating the development of specific resources, producing socially complex relationships, and developing technical knowledge (Barney, 1991).

Furthermore, total quality management (TQM) can develop routines and the fabric of behaviour in a company, which will come from experience inside the organization (Shun et al., 1994). Therefore, total quality management develops various differentiated competencies that lead to efficient and effective operations performance. Therefore, resource-based theory can be adopted for this study to identify the impact of total quality management on operational, logistical, and quality performance.

2.2 Empirical Review

2.2.1 TQM and operational performance

TQM is a managerial philosophy that targets the improvement of each operation in the company by incorporating a philosophy of quality in every department of the organization. Several studies have classified factors of great importance in making TQM successful. Various researchers also outlined the different dimensions. This can be viewed as critical for TQM’s success. Commitment from top management, leadership, employee training, support, and customer focus are standard dimensions of total quality management (Alzoubi & Ahmed, 2019; Haque et al., 2020).

Supply chain quality management is improving performance and grasping opportunities generated by upstream and downstream SC linkages through a systematic approach. SC quality management practices are several steps a company performs to manage an item's quality throughout the whole SC (Quang et al., 2016; Hong. et al., 2017). Pratama and Sulistyowati (2019) concluded that TQM and operational performance correlate. Quality leadership requires a strategic goal, which means that the leader creates suitable conditions for improvement in productivity and performance. The dedication of top management was one of the most critical factors in successfully adopting Total Quality Management (Keinan & Karugu, 2018). Reliability is delivering products to customers at the time and day mentioned. Delivery ensures the product can be delivered efficiently at the mentioned time (Chavez et al., 2017).

The research examined the industrial organizations in Indonesia and concluded that total quality management positively impacts operational performance. Other than enhancing a company's performance, it is also believed that total quality management can mediate human resource management for improving competitive excellence, as in the case of electricity organizations. Yama et al. (2019) conducted a study on universities in Thailand. They used SEM-PLS analysis and concluded that total quality management directly or indirectly positively impacts university performance. Fatihudin et al. (2020) studied private universities in Indonesia. They found that total quality management impacts performance by improving service quality—a study on the electronics industry in Thailand. The study concluded that TQM practices play a significant role in determining performance. Pratama and Sulistyowati's (2019) study findings showed a correlation between QM and operational performance. Nugroho et al. (2020) investigated the SCM correlation, timely and quality management, and their effect on an organization's performance. The results showed that at all strategic and functional levels, there is a correlation between SCM, TQM, and TQM in increasing the company's operational performance. In general, TQM guides the improvement of the performance of an organization, either operationally or financially. Therefore, this theory can be applied to this research based on the impact of TQM on operational performance (Senarath et al., 2020).

2.2.2 TQM and Logistics Performance

Logistics has become the backbone of today's international economy. Because it drives the flow of products and connects them with customers worldwide (Liu et al., 2018), logistics includes all processes involved in acquiring resources, sorting them, and transporting those resources to their destination. Furthermore, it also includes suppliers and distributors, who are chosen based on their effectiveness, accessibility, and prices. To this end, logistics aims for the maintenance of a proper flow of products, which requires a planning process, the management of employees, and the organization of the supply of goods structurally and systematically (Rashid et al., 2024b; Yazdani et al., 2020). In the current context of JIT production systems, improvement of logistics operations (border management, service quality and tracking of items) decreases delivery costs and increases their predictability and reliability. Munim and Schramm (2018) contemplated ninety-one economies. They had seaports and investigated the economic impacts of marine trade from a port infrastructure quality and logistics performance perspective. Results showed that port infrastructural quality helps increase logistics performance.

Another research analyzed the logistics sector on quality management. The elements that pushed the logistics industry in Hong Kong to apply QM were investigated in this study. The evaluation was based on three factors: quality awareness, a system of enhancement, and increasing customer expectations. The research sample consisted of eighty-four Oriental Logistics Company personnel who were permanent employees. The organization designed a ten-step method to achieve quality management, starting with the commitment of management, the team of quality improvement, awareness of quality, measurement of quality, training of supervisors and managers, setting of goals, continuous improvement, effort cause removal, award, and also measures for remedial. The research indicated that the company began using QM to set parameters and procedures. This combined different divisions of the company on the same parameter. Due to this, employee management has become easy.

Meanwhile, the QM structure ensures that each component involved in the work process complies with customer demands and desires. Yu et al. (2017) investigated QM's role in improving logistics performance. The target population chose eight hundred (800) firms from the Kuala Lumpur Stock Exchange (KLSE). A total of one hundred thirteen (113) firms in Malaysia with notable logistics needs were taken as a sample. In this research, measurements were taken from four different domains: performance measurement processes, problems with expectations of customers, instruments quantifying expectations of customers, and satisfaction of customers based on the present findings. Findings revealed businesses from Malaysia adopted QM systems in logistics practices. The other 30% of businesses are projected to implement overall quality management in the following three years. Meanwhile, most businesses viewed QM as a long-term plan because the most significant barrier was a lack of funds. Finally, this study identified the sample size as an evident constraint. Goel et al. (2021) investigated the link between supply chain performance and economic growth, specifically focusing on policy implications and COVID-19 efforts. Data was collected from 10 countries, and results hinted that improving supply chain logistics performance implies positive growth. Janjua et al. (2021) studied the effects of COVID-19 on logistics performance and economic growth in Thailand using a univariate time series forecasting model. Findings verified a strong link between the two variables, mainly through mass tourism. This accounts for the majority of Thailand's GDP. Sergi et al. (2021) investigated the causal link between logistics performance and factors in the Global Competitiveness Index (GCI), categorized into infrastructure, human factors, and institutions. Data was collected from Africa, the European Union, and Asia. The results of the ANOVA test claimed that improvement in all three groups would increase efficiency; however, human factors play a significant role among all three.

2.2.3 TQM and Quality Performance

Total Quality Management (TQM) is a philosophy that aims to achieve quality that satisfies the desired expectations of the consumer. TQM approaches focus on enhancing a company's processes by fulfilling customers' needs and providing the highest value for customers. The target of TQM processes is to ensure that a company's individuals, systems, and processes are continuously improving to make the company efficient and effective (Amin et al., 2017). To win the competition, quality is essential for the production of products, which provides an edge over competitors. Quality is viewed in Japan as a "vision" which should be carried out by companies, and it takes precedence over all other operations. Higher management is responsible for quality, including every stakeholder involved, from suppliers to customers and the general public. Total Quality Management aims to establish a distinctive culture. This has to be built on the endeavours of every member of the firm to fulfil customer expectations by providing the minimum possible price, endeavour, and time. Total quality management has become essential to businesses as a means of lowering costs, boosting the profit and productivity of the company, improving customer satisfaction, gaining an edge over competitors, and generating a more significant return (Fernandes et al., 2017; Rashid & Rasheed, 2024).

The relationship between TQM's organizational performances includes the idea of quality enhancement throughout the organization's managerial operations, which aims to improve products and services' quality, profitability, and consumer satisfaction (Rashid et al., 2024c). Product quality expresses the integration of the specifications of the product, which can fulfil customers' needs by improving products and removing defects from products (Chavez et al., 2017). The relationship between total quality management and organizational performance has been a matter of concern for managers and researchers. Some studies show a positive relationship between total quality management and organizational performance (Sweis et al., 2019; Rashid et al., 2020). Many companies hinted that implementing TQM increased their financial performance, customer satisfaction, operational performance, and employee satisfaction (Panuwatwanich & Nguyen, 2017). SCM in total quality management involves reducing and simplifying the supplier base to help supplier relationships, establishing strategically strong collaborations with suppliers, and using the supplier's knowledge and experience for early product development. Excellent quality management fosters positive and long-term relationships with the supplier by allowing the supplier to engage in product design and manufacturing processes to enhance their product's quality or the quality of their services (Singh et al., 2018).

The TQM strategy ensures that an organization's human resources are working continuously and effectively to improve a product's quality and the services that a company is offering its customers. Therefore, customers play an essential role in deciding quality processes. A company is going to adopt in response to customer demand. Therefore, customer focus is a critical dimension. Because it determines the quality of goods and services in Total quality management practices (Iqbal, 2018), quality management policies will be executed well when top management is actively involved in their implementation functions (Dubey et al., 2017). Top Management's effective total quality management policies include strategic planning for quality management and efficient allocating of resources. This aims to ensure systematic quality processes in evaluations and operations. Top management's devotion varies and includes taking strategic-level decisions that impact the overall performance of a company. A company whose higher management is highly devoted has a high chance of succeeding because of its capability to absorb pressure from external environments and, at the same time, encourage performance (Bouranta et al., 2017; Rasheed & Rashid, 2023). Many studies stated that by implementing total quality management in an organization, product quality and product service can be improved, reducing costs, improving customer satisfaction, and improving performance (Rasheed et al., 2023). Wall's (2021) research findings revealed that the study found no substantial distinction in the strength of the relationship between Total Quality Management practices and quality performance in Thailand's manufacturing and service companies. This research supports the implementation of total quality management in companies. Furthermore, given the findings that there are significant differences between the two sectors, it is essential to consider adopting different Total Quality Management aspects based on the sector's fit.

2.2.4 Moderate role of reverse supply chain (RSC) between TQM and operational, logistical, and quality performance

In the manufacturing industry, the circular economy has become a hot topic. Furthermore, interest in it has recently grown among academics and businesses. The circular economy is being promoted by both developed and developing economies of the world to apply in their businesses (Rashid et al., 2022a; Sehnem et al., 2019). Kirchherr et al. (2018) presented the proposition of the transformation of linear forward value chain (i.e., taking, making, and disposing) processes to a circular supply chain by adopting reusing, re-manufacturing, and recycling processes. The organization must ensure that both remarketing and recovery operations are supported by "Reverse Logistics" (RL) and that both are managed to manage the value chain. Both circular economy and reverse logistics share a common focus; for example, both are concerned with environmental issues and economics (Reike et al., 2018; Hashmi et al., 2021b).

Reverse supply chains (RSCs) are the most common methods for executing inter-organizational circular economy operations. Generally, the reverse supply chain plans a series of efforts for recovering end-of-life and "after-use products, as well as intermediate by-products, from original equipment manufacturers (OEMs), suppliers, and other third parties," The operations mentioned above are classified as open-loop processes, in which items are taken and used again by parties except manufacturers who originally manufactured them, or close-loop operations, in which retrieved items are given back to original manufacturers for recycling, reuse, or refurbishment (Genovese et al., 2017). Transformation of typical linear SCs to reverse supply chains targets reducing waste while also saving the environment by limiting the use of new resources (Shaharudin et al., 2017; Kannan, 2018).

For nearly two decades, reverse supply chain and logistics have gained greater significance and meaning. Reverse SC logistics has evolved from a purely economic issue in managing returned items to producers of products to the sustainability of the environment aspect by attempting to expand the life cycle of items and materials (Altekin et al., 2017; Rashid et al., 2022b). New regulations and policies, like the circular economy, have increased the significance and value of waste recycling, particularly electronic waste (Nowakowski & Mrówczyńska., 2018), and material reuse around the globe. As a result, there has recently been a surge in keenness to form electronic waste supply chains to capitalize on possible profits and market opportunities. Electronic items have a short life; therefore, electronic waste management must be done as soon as possible. Subcontracting different reverse logistics

operations, including electronic waste supply chains, has become a widespread function due to the fact that some firms are highly competitive in reverse and forward SCs (Kot & Grabara, 2017; Rashid & Rasheed, 2023).

A closed-loop supply chain (CLSC) is a combination of both reverse SC and forward SC. This discusses the flow of products in both the downstream and upstream directions, in which many types of returns are accumulated from collection centres consolidated at processing facilities for returned products. When products go through an evaluation process and are subjected to a suitable disposition method, they re-enter secondary markets, and the cycle continues until no substantial value is expected to be retrieved. In the past, the reverse supply chain was referred to as product recovery management (PRM). PRM is concerned with managing products that flow upstream (Islam & Huda, 2018). Genovese et al. (2017) presented the goals of PRM as "to recover as much of the economic (and ecological) value as reasonably as possible, thereby reducing the quantities of waste." According to Chen et al. (2018), both reverse logistics and closed-loop supply chain are interchangeable words because they are considered synonymous.

Genovese et al. (2017) presented five sequential steps of the reverse supply chain, following objectives for each step:

a. Product acquisition: It involves receiving and collecting used items from customers.
b. Reverse logistics is the process of recovering product value. It also includes transportation and centralized return facilities.
c. Inspection and disposition: At these steps, returned products are assessed, and a favourable method of disposition is selected.
d. Re-manufacturing: reusable parts are reclaimed at this stage and the product is restored.
e. Distribution and sales: This stage creates demand for restored items in secondary markets.

Many organizations are collecting their obsolete items and entering them into the re-manufacturing process. Organizations like Apple, HP, and Dell participate in the reverse supply chain by motivating consumers to return their obsolete items (Jafari et al., 2015). A study conducted on Iran, considering it to be a developing economy, revealed that in addition to rewards (which are given by companies for returning obsolete products), other factors also play a decisive role in determining whether consumers are going to return electronic waste or not (Jafari et al., 2015). To realize the potential of reverse supply chains, strong partnerships and coordination are required across supply chain operations; in this context, purchasing businesses can play a key role as orchestrators of these operations, employing leadership methods and governance structures (Blome et al., 2017; Roman, 2017). Mangla et al. (2019) determined supply chain flexibility, dynamism, cooperation, transparency, relational capabilities, and innovation as performance dimensions. These are responsible for operational efficacy and enhancing sustainability in a supply chain. Alayón et al. (2017) proposed the implementation of the 3 Rs (reduce, reuse, recycle) to make the operations environment sustainable. Grounded in structure conduct performance (SCP) theory, organizational structure factors, such as commitment towards sustainable SC commitment towards reverse logistics, are thought to enable the possibly effective conduct of a sustainable reverse logistics capability, which arguably leads to improved operational performance (Albhirat et al., 2024). Khor et al. (2016) found that if waste management and disposal significantly improve, they will enable operational performance. According to Dev et al. (2020), increasing the life cycle of any item and maximizing the value of reverse logistics operations have been matters of great importance and concern, and the reverse logistics system has been examined for economic and environmental performance.

Guide and Van Wassenhove (2009) explained two perspectives on logistics functions. There are inbound logistics and outbound logistics. Inbound logistics deals with bringing items to the company. All stakeholders should be significantly integrated and coordinate effectively to manage both logistics functions. All coordinating activities involving products that have reached the end of their useful life or require a new adjustment to move forward are referred to as reverse logistics. The collection of civil waste that begins with garbage collection and ends in waste reuse is an example of

reverse logistics and among the essential coordinating techniques within the show term (Habibi et al., 2017).

The reverse supply chain can be used for the improvement of process design, product design, and operations because it provides a plethora of actionable insights. To increase the efficiency of a reverse supply chain and address market and nonmarket forces, a firm must first assess the aspects of business that are impacted by rates of return and recycling and choose areas to focus on and put its efforts into (Singh & Agrawal, 2018). Pushpamali et al.'s (2021) study results disclosed that reverse logistics activities can decrease the sourcing cost of materials significantly compared to using new materials while maintaining the time of construction and quality of the project. Furthermore, they conducted interviews with fifteen experts in construction and found that their reverse logistics activities preserve the material's quality and the project's life as new materials.

2.3 Research Framework

By reviewing the literature, a research framework is adopted. Total Quality Management (TQM) is an independent variable in this study, and operational performance, logistical performance, and quality performance are dependent variables. Furthermore, the reverse supply chain is used as a moderator to evaluate its moderating role. Figure 1 illustrates the research framework.

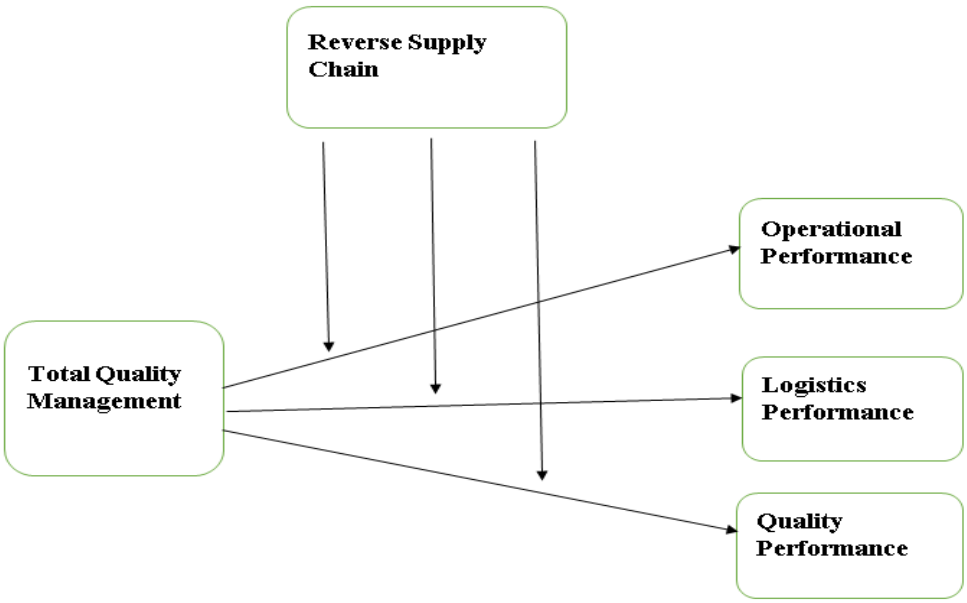

Figure 1: Research framework

Source: Author's work with the support of literature

The following are the hypotheses of this research.

H1: TQM has a positive influence on Operational performance.

H2: TQM has a positive influence on logistical performance.

H3: TQM has a positive influence on Quality performance.

H4: The reverse supply chain moderates TQM and operational performance.

H5: The reverse supply chain moderates TQM and logistical performance.

H6: The reverse supply chain moderates the relationship between TQM and quality performance.

3. Research Methodology

To analyze the relationship and influence of the dependent variable on the independent variable, as well as the influence of the mediating variable on the dependent and independent variables in terms of results, we will employ a deductive approach. Using regression analysis, we will show how independent factors affect dependent variables. We will use correlation to examine the effects of different factors on one another and the relationship between two dependent variables. Because, as per Shawn, it explains the consequences for a specific period that may vary in the future, the research is a cross-sectional study (Rashid et al., 2021). This study uses a descriptive research design to establish the impact of TQM activities on operational, logistics, and quality performance. It also evaluates the moderating role of the reverse supply chain on the relationship between TQM and operational, logistics, and quality performance. There are two sources, including primary sources. An essential source could be an area where we can get firsthand data or unique proof. An interrogation approach was combined with a standardized questionnaire to collect primary data.

In contrast, a secondary source is a location where we can obtain information that another individual has already gathered. The company's bank statements, journals, and analyses gather primary facts (Khan et al., 2021; 2022). This study adopts an empirical investigation design because it focuses on the impact of TQM practices on operational, logistical, and quality performance and the moderating role of the reverse supply chain on operational, logistical, and quality performance. Qualitative descriptive research provides data that explains the "who, what, and where of events or experiences" from a subjective perspective and poses the issue of trustworthiness (Haq et al., 2023). Descriptive research design focuses on explaining the features of an individual or group (Rashid & Rasheed, 2022; Rashid et al., 2021). Studies concerned with particular predictions, narrating facts and features of scenarios, groups, or individuals are descriptive research (Agha et al., 2021; Hashmi & Mohd, 2020).

3.4 Sampling Strategy

The population for this research is senior managerial-level staff from various departments of steel manufacturing companies in Pakistan. A sample design is a method for choosing a representative sample from a given population. It refers to the researcher's process or protocol for selecting items for the survey (Haque et al., 2021; Rekha et al., 2018). Simple random sampling will be used because it is generalizable. Furthermore, it is reliable, easy to understand, and may be understood easily. Information is collected from managerial-level employees. Managers are respondents to this study. In various research studies, one respondent has been taken from each organization (Alrazehi et al., 2021; Senarath et al., 2020). A questionnaire was used to collect data. A questionnaire is made after considering a literature review. The questionnaire is developed attentively and with great care to identify the impact of independent variables on dependent variables and the moderator's moderation role.

4 Result

4.1 Descriptive Profile of Data

In this research, Total Quality Management (TQM) is taken as an independent variable (IV) along with dependent variables like operational performance (OP), logistics performance (LP), quality performance (QP), and reverse supply chain (RSC) to check the moderation role between the independent variable and dependent variables. Data was collected from employees of 10 steel companies. Furthermore, SPSS and SmartPLS are used to run tests.

4.2 Validation of the Model

A regression model is used to check the results of the data collected through a designed

questionnaire. A questionnaire was adopted from various sources for different variables. Many researchers have used this same model for the same sort of variables. What are the total quality management (TQM), operational performance (OP), logistics performance (LP), quality performance (QP), and reverse supply chain (RSC) in this research?

$$Y = A + B_1X_1 + B_2X_2 + E$$

$$Y = A + B_1X_1 * X_2 + E$$

4.3 Relationship of Variables in the Model

Our structural model, which is based on our regression model analysis (SEM), is a set of statistical techniques that are used to measure and analyze the relationship between the observed and given latent variables; some of them are independent, while our primary subject is dependencies, and by nature, this model is said to be similar but more potent than the simple regression analysis that explains the linear and multi-factor correlation and the casual relationship among all the variables. At the same time, this model also focuses on the accountability of some significant errors in our study.

4.4 Demographics

This section presents the demographic profile of the respondents. As you can see in Table 1, it has been found that out of 40 respondents, 25 had a master's degree, which accounts for 62.5%. Those with a bachelor's degree were 8 (20%), and 7 (17.5%) had other degrees. The details are shown in table 1:

Table 1: Education

Education		Frequency	Per cent
Valid	Bachelors	8	20
	Masters	25	62.5
	Others	7	17.5
	Total	40	100.0

Source: SPSS output

In addition to the education, respondents were asked about their experience. As you can check in Table 2, it was found that out of the respondents, 15 (37.5%) had experience between 1 and 5 years, which reflects the inclusion of young professionals. The data also shows that 14 respondents (35%) had experience for more than ten years, and 11 (27.5%) had experience between 5 and 10 years. This shows well-diversified respondents in terms of experience.

Table 2: Experience

Experience		Frequency	Per cent
Valid	1-5 Years	15	37.5
	6-10 Years	11	27.5
	More Than 10 Years	14	35
	Total	40	100.0

Source: SPSS output

Results were extracted from the survey questionnaire data. The data was collected through email. The data was initially assessed for quality through data screening and preliminary analysis. The following section presents the preliminary data analysis. In the first step, the data was assessed for missing values. In the data collection, missing values occur when respondents fail to answer the item or items in the survey questionnaire. In this study, the frequency and imputation of the missing value can be used to assess the missing value for each item of the questionnaire to check the missing data. However, the results of the returned questionnaires show that the values in the data were present. Therefore, the data is free of any missing values. In the preliminary analysis, detecting unusual values or outliers has immense importance. These values may mislead the analysis results and lead to underestimating or overestimating the coefficients (Das et al., 2021). According to Rashid et al. (2019),

outliers are observations that contain an unusual value in a single variable. They suggest that such values can be detected using histograms, boxplots, and standardized (z) scores of a variable. This study used the upper and lower bounds of the z score to test outliers. Appendix D1 shows the results of the univariate analysis based on standardized values. Hair et al. (2022) documented that the values of z scores greater than four or less than four fall under the category of outliers. The results showed that all the z-scores of variables are within the range Hair et al. (2020) suggested, between -4 and 4.

Furthermore, the range of the z score for the current research values ranged from -3.28 to 3.5. This range shows an acceptable range of z score, and all 98 cases are under a range of ±4. Therefore, the data is free from any outliers and suitable for further analysis.

This study's data was assessed to check whether it follows a normal distribution. The data that does not follow a normal distribution is skewed, either left-skewed or right-skewed. The data could be considered normal when the skewness of each question is between -2 and +2 and the kurtosis is between -7 and +7. Khan et al. (2023a) argued that acceptable values for the duo should not be greater than ±2. The values between -2 and +2 and kurtosis values between -3 and +3 demonstrate sufficient normality. The data fall under the category of normality based on the threshold (Khan et al., 2023b).

This section represents the focal construct of descriptive statistics. As you can see in Table 3, the data shows that Total Quality Management has a mean value of 3.73, which is between neutral and agree but more inclined towards agree, and a standard deviation of 0.871. In addition, the mean values calculated for operational performances are 3.58, and the standard deviation is 0.777, which falls between neutral and agree but is more inclined towards agree. The mean value of logistic performance shows a mean value of 3.041 and a standard deviation of 0.729, which shows a mean value response between neutral and agree but more inclined towards neutral. In addition, the calculated mean value of quality performance is 3.593, with a standard deviation of 0.761. This shows a response between agree and neutral but inclined towards agree.

Table 3: Descriptive statistics

Variable	Mean	Standard Deviation
Total Quality Management (TQM)	3.725	0.871
Operational Performance (OP)	3.576	0.777
Logistics Performance (LP)	3.041	0.729
Quality Performance (QP)	3.593	0.761
Reverse Supply Chain (RSC)	3.852	0.644

Source: SmartPLS output

The mean value of the reverse supply chain shows a mean value of 3.852 and a standard deviation of 0.644, which shows a mean value response between neutral and agree but more inclined towards agree. The assessment of the reliability and validity of the data is an important step. The values given in Table 4 show satisfactory reliability for the data. The values of AVE are above the threshold of 0.50 (Rashid et al., 2024c). The values of composite reliability are also above 0.70 (Rashid & Rasheed, 2023), which indicates the data is suitable for further analysis. The results can be drawn based on the data as it is of good quality.

Table 4: Construct reliability and validity

	Cronbach's Alpha	Rho_A	Composite Reliability	Average Variance Extracted (Ave)
LP	0.938	0.963	0.949	0.726
OP	0.909	0.941	0.923	0.635
QP	0.952	0.959	0.960	0.777
RSC	0.732	0.822	0.829	0.552
TQM	0.884	0.899	0.901	0.505

Source: SmartPLS output

4.5 Common Method Variance Test

The values presented in Table 5 show that the variables meet the criteria, and there is no issue

of standard method variance. The values are presented in the table for detail. The values presented in Table 5 show that the variables meet the criterion, and there is no issue of standard method variance. The values are presented in the table for detail.

Table 5: Common method variance test

Le1					0.237
Le2					0.051
Le3					0.161
Le4					0.137
Lp1	0.247				
Lp2	0.163				
Lp3	0.191				
Lp4	0.199				
Lp5	0.121				
Lp6	0.105				
Lp7	0.151				
Op1		0.099			
Op2		0.026			
Op3		0.161			
Op4		0.239			
Op5		0.170			
Op6		0.248			
Op7		0.276			
P2			0.046		
Pd1			0.189		
Pd2			0.197		
Pd3			0.177		
Pd4			0.144		
Pd5			0.134		
Pd6			0.133		
Prm1					0.100
Prm2					0.199
Prm3					0.247
Prm4					0.195
Rsc12				0.505	
Rsc13				0.275	
Rsc14				0.260	
Rsc15				0.276	
Wm1				0.165	

Source: SmartPLS output

Table 6 also shows that this data meets the requirement of the HTMT ratio.

Table 6: HTMT Ratio

LP	Op	QP	Rcs	TQM	
LP	0.852				
Op	-0.002	0.797			
QP	0.174	-0.193	0.881		
Rcs	0.208	0.169	-0.364	0.743	
TQM	0.059	0.140	-0.354	0.285	0.710

Source: SmartPLS output

4.6 Measurement Model

The value of R^2 in Table 7 shows that all variables together provide a good explanation of the model. TQM successfully explains about 27% of the changes in the dependent variable (logistic performance). Moreover, TQM also explains 28% of the changes in the dependent variable, operational performance, while the highest explanation is in the context of quality performance, where TQM

explains 40% of the changes in the dependent variable (Rashid & Amirah, 2017). This model shows a reasonable explanation that falls under the moderate to good explanation (Rashid, 2016).

Table 7: R-Square

	R Square	R Square Adjusted
Lp	0.269	0.208
Qp	0.400	0.322
Op	0.281	0.221

Source: SmartPLS output

Hypothesis testing eight was conducted using structural equation modelling, and a bootstrap of 5000 was used. The statistical values in Table 8 show that TQM significantly influences logistic performance (β=0.264, p<0.24). Based on p values, it is inferred that TQM has a significant influence on logistic performance. In addition to that, TQM has a significant influence on operational performance (β =0.198, p<0.032) and quality performance (β = 0.162, p<0.038). This research also assesses the moderating effect of the reverse supply chain on the relationship between logistic performance, quality performance, and operational performance. The results indicate that reverse supply chain management moderates the relationship between TQM and operational performance (β=0.449; p<0.000). It also moderates the relationship between total quality management and quality performance (β = 0.396; p<0.041) but fails to moderate the relationship between logistic performance and TQM (β = 0.095; p<0.276). The majority of the hypothesis seems to be accepted as proposed. The details are given in Table 8. Figure 2 illustrates the path analysis of the structural model.

Table 8: Hypotheses Testing Using Structural Regression Model

B	T-Statistics		P-Values
LP -> QP	0.157	2.187	0.048
Rcs -> LP	0.194	2.540	0.046
Rcs -> Op	0.052	0.254	0.780
Rcs -> QP	0.358	2.474	0.030
TQM -> LP	0.264	3.359	0.024
TQM -> Op	0.198	3.123	0.032
TQM -> QP	0.162	3.959	0.038
M1 -> Op	0.499	3.770	0.000
M2 -> QP	0.396	2.814	0.041
M3 -> LP	0.095	1.089	0.276

Source: SmartPLS output

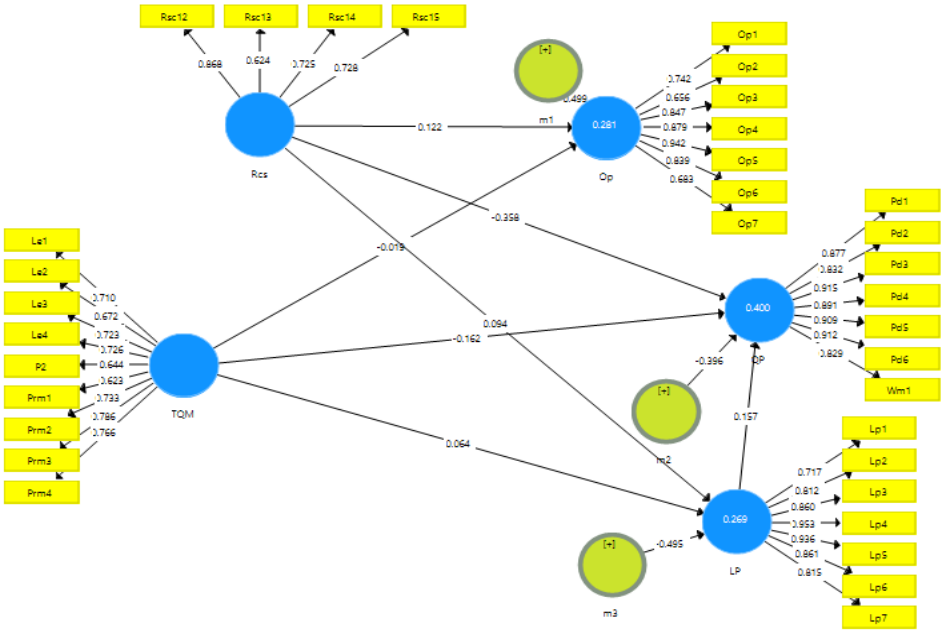

Figure 2: SEM analysis

Source: SmartPLS output

5. Discussion, Conclusion and Recommendations

5.1 Discussion

Results collected using SMART PLS and SPSS software show that our independent variable significantly impacts all three dependent variables: operational performance, logistics performance, and quality performance. Furthermore, the results confirm TQM's impact on the reverse supply chain. Moreover, results show that the reverse supply chain plays a moderating role between our independent variable (TQM) and two dependent variables: operational performance and quality performance. However, the reverse supply chain does not mediate between total quality management (TQM) and logistical performance. Many studies were conducted to check the influence of total quality management on operational performance. Operational performance was taken as a single independent variable, and the results also suggested a positive relationship between total quality management and operational performance.

Similarly, the relationship of other independent variables was also studied with total quality management. However, this research is different from many previous studies. This study is conducted within the context of the Pakistani steel industry. Furthermore, this paper examined the relationship between three independent variables and total quality management. Moreover, there were fewer responses to the shared questionnaire.

This study provides proof of the linkage between total quality management (TQM) and operational performance (OP), logistics performance (LP), and quality performance. Furthermore, it confirms the significant impact of TQM on the reverse supply chain. This research is an addition to the literature on quality management. This study provides insight into the role of TQM and its impact on the mentioned dependent variables in the context of the Pakistani industry. This research paper provides a framework that synergizes total quality management practices with the reverse supply chain to maximize influence on operational performance, logistics performance, and quality performance.

5.2 Policy Implications

In today's internationally competitive market, the significance of quality management has

rapidly increased. Therefore, performance and assessment have attracted the attention of both academia and industry. From the results of this study, it is clear that adopting total quality management practices is helpful because it helps attain business goals. Furthermore, this research has empirically verified that steel companies that adopt total quality management practices achieve a competitive advantage.

Research findings suggest a significant impact of our independent variables, Total Quality Management (TQM), on dependent variables, such as operational performance (OP), logistical performance (LP), and quality performance (QP). Furthermore, results also confirm that the reverse supply chain plays a role in moderation between the reverse supply chain and two dependent variables: operational performance (OP) and quality performance (QP). Organizations can benefit from the adoption of total quality management practices. They can increase operational logistical and quality performance by improving the dimensions of total quality management, as well as leadership, customer focus, planning, and process management practices. This can provide a competitive advantage and help sustain the market. Furthermore, the study suggests adopting reverse supply chain practices to strengthen the impact of total quality management on operational performance and quality performance.

5.3 Organizational Implications

The business environment has become more competent than in the past, so companies should adopt various methods for attaining competitive advantage. For this purpose, operational performance is critical for achieving a competitive advantage. This study proposes the adoption of total quality management practices for the attainment of operational performance, logistical performance, and quality performance. Organizations can increase their focus on implementing the TQM philosophy to improve operational, logistical, and quality performance and reverse supply chain activities. The results suggest a significant influence of TQM on operational performance, logistical performance, quality performance, and the reverse supply chain. Organizations must improve customer focus activities, process management, leadership, and planning to increase their operational, logistics, and quality performance because these dimensions of TQM play a vital role. Furthermore, reverse supply chain activities are helpful in the removal of waste and the reuse of materials. This also helps in cost savings and makes the organization more competitive.

5.4 Limitations and Future Research

This study has some limitations. Firstly, data was collected through a questionnaire. This was shared through email. Where there was no control over who was actually completing the shared questionnaire. Furthermore, there needed to be higher response rates. This is also a potential problem. Therefore, future researchers can adopt different methodologies like interviews, field studies, and other data collection methods. Future studies may be conducted in different industries in Pakistan by using this research framework. It will be helpful to examine the role of total quality management and its impact on operational, logistics, and quality performance. Suppose the findings of other industries support the hypothesis mentioned. In that case, it will be helpful for those industries to adopt a total quality management approach and focus on the dimensions of TQM to improve operational, logistics, and quality performance. Moreover, future researchers may extend this research by taking different independent variables on other time horizons in different industries and regions. So, the results may be different from this research's findings. This research can be a platform for those research works.

References

Agha, A. A., Rashid, A., Rasheed, R., Khan, S., & Khan, U. (2021). Antecedents of Customer Loyalty in Telecomm Sector. *Turkish Online Journal of Qualitative Inquiry, 12*(9), 1352–1374. https://www.tojqi.net/index.php/journal/article/view/5873/4175

Alayón, C., Säfsten, K., & Johansson, G. (2017). Conceptual sustainable production principles in practice: Do they reflect what companies do? *Journal of Cleaner Production, 141*, 693–701. https://doi.org/10.1016/j.jclepro.2016.09.079

Albhirat, M. M., Rashid, A., Rasheed, R., Rasool, S., Zulkiffli, S. N. A., Zia-Ul-Haq, H. M., & Mohammad, A. M. (2024). The PRISMA Statement in Enviropreneurship Study: A Systematic Literature and a Research Agenda. *Cleaner Engineering and Technology*, *18*(2024), 100721. https://doi.org/10.1016/j.clet.2024.100721

Alrazehi, H. A. A. W., Amirah, N. A., Emam, A. S., & Hashmi, A. R. (2021). Proposed model for entrepreneurship, organizational culture and job satisfaction towards organizational performance in International Bank of Yemen. *International Journal of Management and Human Science*, *5*(1), 1-9. https://ejournal.lucp.net/index.php/ijmhs/article/view/1330/1399

Altekin, F. T., Aylı, E., & Şahin, G. (2017). After-sales services network design of a household appliances manufacturer. *Journal of the Operational Research Society*, *68*(9), 1056–1067. https://doi.org/10.1057/s41274-016-0142-y

Alzoubi, H., & Ahmed, G. (2019). Do TQM practices improve organizational success? A case study of the electronics industry in the UAE. *International Journal of Economics and Business Research*, *17*(4), 459. https://doi.org/10.1504/IJEBR.2019.099975

Amin, M., Aldakhil, A. M., Wu, C., Rezaei, S., & Cobanoglu, C. (2017). The structural relationship between TQM, employee satisfaction and hotel performance. *International Journal of Contemporary Hospitality Management*, *29*(4), 1256–1278. https://doi.org/10.1108/ijchm-11-2015-0659

Arumugam, V., Ooi, K., & Fong, T. (2008). TQM practices and quality management performance. *The TQM Journal*, *20*(6), 636–650. https://doi.org/10.1108/17542730810909383

Baloch, N. & Rashid, A. (2022). Supply chain networks, complexity, and optimization in developing economies: a systematic literature review and meta-analysis. *South Asian Journal of Operations and Logistics*, *1*(1), 1–13. https://doi.org/10.57044/SAJOL.2022.1.1.2202

Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management*, *17*(1), 99–120. https://doi.org/10.1177/014920639101700108

Blome, C., Foerstl, K., & Schleper, M. C. (2017). Antecedents of green supplier championing and greenwashing: An empirical study on leadership and ethical incentives. *Journal of Cleaner Production*, *152*, 339–350. https://doi.org/10.1016/j.jclepro.2017.03.052

Bouranta, N., Psomas, E. L., & Pantouvakis, A. (2017). Identifying the critical determinants of TQM and their impact on company performance. *The TQM Journal*, *29*(1), 147–166. https://doi.org/10.1108/tqm-11-2015-0142

Bowersox, D. J., Closs, D. J., & Cooper, M. B. (2007). *Supply Chain Logistics Management*. Irwin/McGraw-Hill.

Chavez, R., Yu, W., Jacobs, M. A., & Feng, M. (2017). Data-driven supply chains, manufacturing capability and customer satisfaction. *Production Planning & Control*, *28*(11-12), 906–918. https://doi.org/10.1080/09537287.2017.1336788

Chen, R., Lee, Y.-D., & Wang, C.-H. (2018). Total quality management and sustainable competitive advantage: serial mediation of transformational leadership and executive ability. *Total Quality Management & Business Excellence*, *31*(5/6), 1–18. https://doi.org/10.1080/14783363.2018.1476132

Das, S., Ghani, M., Rashid, A., Rasheed, R., Manthar, S., & Ahmed, S. (2021). How customer satisfaction and loyalty can be affected by employee's perceived emotional competence: The mediating role of rapport. *International Journal of Management*, *12*(3), 1268–1277. https://doi.org/10.34218/IJM.12.3.2021.119

Dev, N. K., Shankar, R., & Swami, S. (2020). Diffusion of green products in Industry 4.0: Reverse logistics issues during inventory and production planning system design. *International Journal of Production Economics*, *223*, 107519. https://doi.org/10.1016/j.ijpe.2019.107519

Dubey, R., Gunasekaran, A., Childe, S. J., Papadopoulos, T., Hazen, B. T., & Roubaud, D. (2017).

Examining top management commitment to TQM diffusion using institutional and upper echelon theories. *International Journal of Production Research*, *56*(8), 2988–3006. https://doi.org/10.1080/00207543.2017.1394590

Fatihudin, D., Firmansyah, M. A., & Mukarromah, N. (2020). How Service Quality Mediates Total Quality Management (TQM) and Organizational Citizenship Behaviour (OCB) Affects the Performance of Private Universities in Indonesia. *International Journal of Innovation, Creativity and Change*, *11*(8), 14–23. http://repository.um-surabaya.ac.id/4896/

Fazlollahtabar, H. (2019). Operations and inspection Cost minimization for a reverse supply chain. *Operational Research in Engineering Sciences: Theory and Applications*, *1*(1), 91–107. https://doi.org/10.31181/oresta19012010191f

Fernandes, A. C., Sampaio, P., Sameiro, M., & Truong, H. Q. (2017). Supply chain management and quality management integration. *International Journal of Quality & Reliability Management*, *34*(1), 53–67. https://doi.org/10.1108/ijqrm-03-2015-0041

Fugate, B. S., Autry, C. W., Davis-Sramek, B., & Germain, R. N. (2012). Does knowledge management facilitate logistics-based differentiation? The effect of global manufacturing reach. *International Journal of Production Economics*, *139*(2), 496–509. https://doi.org/10.1016/j.ijpe.2012.05.008

Gani, A. (2017). The Logistics Performance Effect in International Trade. *The Asian Journal of Shipping and Logistics*, *33*(4), 279–288. ScienceDirect. https://doi.org/10.1016/j.ajsl.2017.12.012

Genovese, A., Acquaye, A. A., Figueroa, A., & Koh, S. C. L. (2017). Sustainable Supply Chain Management and the Transition Towards a Circular Economy: Evidence and Some Applications. *Omega*, *66*(B), 344–357. https://doi.org/10.1016/j.omega.2015.05.015

Goel, R. K., Saunoris, J. W., & Goel, S. S. (2021). Supply chain performance and economic growth: The impact of COVID-19 disruptions. *Journal of Policy Modeling*, *43*(2). https://doi.org/10.1016/j.jpolmod.2021.01.003

Guide, V. D. R., & Van Wassenhove, L. N. (2009). The Evolution of Closed-Loop Supply Chain Research. *Operations Research*, *57*(1), 10–18. https://doi.org/10.1287/opre.1080.0628

Gupta, T. K., & Singh, V. (2017). Measurement of service quality of automobile organization by artificial neural network. *International Journal of Management Concepts and Philosophy*, *10*(1), 32. https://doi.org/10.1504/ijmcp.2017.081989

Habibi, M. K. K., Battaïa, O., Cung, V.-D., & Dolgui, A. (2017). The collection-disassembly problem in the reverse supply chain. *International Journal of Production Economics*, *183*, 334–344. https://doi.org/10.1016/j.ijpe.2016.06.025

Hair Jr, J. F., Williams Jr, R. I., & Manley, S. C. (2022). Enhancing TQM's effect on small business performance: a PLS-SEM exploratory study of TQM applied with a comprehensive strategic approach. *The TQM Journal*. https://doi.org/10.1108/tqm-10-2021-0299

Haq, Z. U., Rasheed, R., Rashid, A., & Akhter, S. (2023). Criteria for Assessing and Ensuring the Trustworthiness in Qualitative Research. *International Journal of Business Reflections*, *4*(2), 150–173. Available at: http://journals.pu.edu.pk/journals/index.php/ijbr/article/view/7358

Haque, A. ul, Sher, A., & Mariusz Urbański. (2020). Is the Role of Authentic Leadership Effective in Managing Occupational Stress and Psychological Capital? *Forum Scientiae Oeconomia*, *8*(2), 59–77. https://doi.org/10.23762/fso_vol8_no2_4

Haque, I., Rashid, A., & Ahmed, S. Z. (2021). The Role of Automobile Sector in Global Business: Case of Pakistan. *Pakistan Journal of International Affairs*, *4*(2), 363-383. https://doi.org/10.52337/pjia.v4i2.195

Hashmi, A. (2022). Factors affecting the supply chain resilience and supply chain performance. *South Asian Journal of Operations and Logistics*, *1*(2), 65–85.

https://doi.org/10.57044/SAJOL.2022.1.2.2212

Hashmi, A. R., & Mohd, A. T. (2020). The effect of disruptive factors on inventory control as a mediator and organizational performance in the health department of Punjab, Pakistan. *International Journal of Sustainable Development & World Policy*, *9*(2), 122-134. https://doi.org/10.18488/journal.26.2020.92.122.134

Hashmi, A. R., Amirah, N. A., & Yusof, Y. (2020a). The mediating effect of integrated systems on the relationship between supply chain management practices and public healthcare performance: Structural Equation Modeling. *International Journal of Management and Sustainability*, *9*(3), 148-160. https://doi.org/10.18488/journal.11.2020.93.148.160

Hashmi, A. R., Amirah, N. A., & Yusof, Y. (2021b). Organizational performance with disruptive factors and inventory control as a mediator in public healthcare of Punjab, Pakistan. *Management Science Letters*, *11*(1), 77-86. https://doi.org/10.5267/j.msl.2020.8.028

Hashmi, A. R., Amirah, N. A., Yusof, Y., & Zaliha, T. N. (2020b). Exploring the dimensions using exploratory factor analysis of disruptive factors and inventory control. *The Economics and Finance Letters*, *7*(2), 247-254. https://doi.org/10.18488/journal.29.2020.72.247.254

Hashmi, A. R., Amirah, N. A., Yusof, Y., & Zaliha, T. N. (2021a). Mediation of inventory control practices in proficiency and organizational performance: State-funded hospital perspective. *Uncertain Supply Chain Management*, *9*(1), 89-98. https://doi.org/10.5267/j.uscm.2020.11.006

Hashmi, R. (2023). Business Performance Through Government Policies, Green Purchasing, and Reverse Logistics: Business Performance and Green Supply Chain Practices. *South Asian Journal of Operations and Logistic*s, *2*(1), 1–10. https://doi.org/10.57044/SAJOL.2023.2.1.2301

Hong, J., Zhang, Y., & Shi, M. (2017). The impact of supply chain quality management practices and knowledge transfer on organizational performance: an empirical investigation from China. *International Journal of Logistics Research and Applications*, *21*(3), 259–278. https://doi.org/10.1080/13675567.2017.1394992

Hung, R. Y. Y., Lien, B. Y.-H., Yang, B., Wu, C.-M., & Kuo, Y.-M. (2011). Impact of TQM and organizational learning on innovation performance in the high-tech industry. *International Business Review*, *20*(2), 213–225. https://doi.org/10.1016/j.ibusrev.2010.07.001

Iqbal, A., & Asrar-ul-Haq, M. (2018). Establishing the relationship between TQM practices and employee performance: The mediating role of change readiness. *International Journal of Production Economics*, *203*, 62–68. https://doi.org/10.1016/j.ijpe.2018.05.034

Islam, M. T., & Huda, N. (2018). Reverse logistics and closed-loop supply chain of Waste Electrical and Electronic Equipment (WEEE)/E-waste: A comprehensive literature review. *Resources, Conservation and Recycling*, *137*, 48–75. https://doi.org/10.1016/j.resconrec.2018.05.026

Jafari, A., Heydari, J., & Keramati, A. (2015). Factors affecting incentive dependency of residents to participate in e-waste recycling: a case study on the adoption of e-waste reverse supply chain in Iran. *Environment, Development and Sustainability*, *19*(1), 325–338. https://doi.org/10.1007/s10668-015-9737-8

Janjua, Laeeq Razzak., F. M., Sukjai, P., Rehman, A., & Yu, Z. (2021). Impact of COVID-19 pandemic on logistics performance, economic growth and tourism industry of Thailand: an empirical forecasting using ARIMA. *Brazilian Journal of Operations & Production Management*, *18*(2), e2021999. https://doi.org/10.14488/BJOPM.2021.001

Kannan, D. (2018). Role of Multiple Stakeholders and the Critical Success Factor Theory for the Sustainable Supplier Selection Process. *International Journal of Production Economics*, *pp. 195*, 391–418. https://doi.org/10.1016/j.ijpe.2017.02.020

Karia, N., & Asaari, M. H. A. H. (2016). Innovation capability: the impact of teleworking on sustainable competitive advantage. *International Journal of Technology, Policy and Management*, *16*(2),

181-194. https://doi.org/10.1504/IJTPM.2016.076318

Kaynak, H. (2003). The relationship between total quality management practices and their effects on firm performance. *Journal of Operations Management*, *21*(4), 405–435. https://doi.org/10.1016/s0272-6963(03)00004-4

Kaynak, H., & Hartley, J. L. (2007). A replication and extension of quality management into the supply chain. *Journal of Operations Management*, *26*(4), 468–489. https://doi.org/10.1016/j.jom.2007.06.002

Keinan, A. S., & Karugu, J. (2018). Total quality management practices and performance of manufacturing firms in Kenya: Case of Bamburi Cement Limited. *International Academic Journal of Human Resource and Business Administration*, *3*(1), 81-99.

Khan, S. K., Ahmed, S., & Rashid, A. (2021). Influence of social media on purchase intention and customer loyalty of Generation Y with the mediating effect of conviction: A case of Pakistan. *Pakistan Journal of International Affairs*, *4*(2), 526–548. https://doi.org/10.52337/pjia.v4i2.207

Khan, S. K., Rashid. A., Benhamed, A., Rasheed, R., & Huma, Z. (2023b). Effect of leadership styles on employee performance by considering psychological capital as mediator: evidence from airlines industry in an emerging economy. *World Journal of Entrepreneurship, Management and Sustainable Development*, *18*(6), 799–818. https://doi.org/10.47556/J.WJEMSD.18.6.2022.7

Khan, S., Rasheed., R., Rashid, A., Abbas, Q., & Mahboob, F. (2022). The Effect of Demographic Characteristics on Job Performance: An Empirical Study from Pakistan. *Journal of Asian Finance, Economics and Business*, *9*(2), 283–294. https://doi.org/10.13106/JAFEB.2022.VOL9.NO2.0283

Khan, S., Rashid, A., Rasheed, R., & Amirah, N. A. (2023a). Designing a knowledge-based system (KBS) to study consumer purchase intention: the impact of digital influencers in Pakistan. *Kybernetes, 52*(5), 1720-1744. https://doi.org/10.1108/K-06-2021-0497

Khor, K. S., Udin, Z. M., Ramayah, T., & Hazen, B. T. (2016). Reverse logistics in Malaysia: The contingent role of institutional pressure. *International Journal of Production Economics, 175*, 96–108. DOI: 10.1016/j.ijpe.2016.01.020

Kirchherr, J., Piscicellia, L., Bour, R., Kostense-Smit, E., Muller, J., Huibrechtse-Truijens, A., & Hekkert, M. (2018). Barriers to the circular economy: evidence from the European Union (EU). *Ecological Economics, 150*, 264-272. https://doi.org/10.1016/j.ecolecon.2018.04.028

Kot, S., & Grabara, J. (2017). Publications analysis according to management disciplines based on Scopus-indexed journals from eastern European countries. *Polish Journal of Management Studies*, *16*(2), 147–159. https://doi.org/10.17512/pjms.2017.16.2.13

Li, L., Markowski, C., Xu, L., & Markowski, E. (2008). TQM—A predecessor of ERP implementation. *International Journal of Production Economics*, *115*(2), 569–580. https://doi.org/10.1016/j.ijpe.2008.07.004

Liu, J., Yuan, C., Hafeez, M., & Yuan, Q. (2018). The relationship between environment and logistics performance: Evidence from Asian countries. *Journal of Cleaner Production, pp. 204*, 282–291. https://doi.org/10.1016/j.jclepro.2018.08.310

Mangla, S. K., Kusi-Sarpong, S., Luthra, S., Bai, C., Jakhar, S. K., & Khan, S. A. (2019). Operational excellence for improving sustainable supply chain performance. *Resources, Conservation & Recycling*, *142*, 277-278. https://doi.org/10.1016/j.resconrec.2018.11.014

Mentzer, J. T., Flint, D. J., & Hult, G. T. M. (2001). Logistics Service Quality as a Segment-Customized Process. *Journal of Marketing*, *65*(4), 82–104. https://doi.org/10.1509/jmkg.65.4.82.18390

Munim, Z. H., & Schramm, H. J. (2018). The impacts of port infrastructure and logistics performance on economic growth: the mediating role of seaborne trade. *Journal of Shipping and Trade, 3*(1),

1-19. https://doi.org/10.1186/s41072-018-0027-0

Nowakowski, P., & Mrówczyńska, B. (2018). Towards sustainable WEEE collection and transportation methods in the circular economy - Comparative study for rural and urban settlements. *Resources, Conservation and Recycling*, *135*, 93–107. https://doi.org/10.1016/j.resconrec.2017.12.016

Nugroho, A., Christiananta, B., Wulani, F., & Pratama, I. (2020). Exploring the Association among Just in Time, Total Quality and Supply Chain Management Influence on Firm Performance: Evidence from Indonesia. *International Journal of Supply Chain Management, 9*(2), 920-928.

Pambreni, Y., Khatibi, A., Azam, S., & Tham, J. J. M. S. L. (2019). The influence of total quality management toward organization performance. *Management Science Letters, 9*(9), 1397-1406. https://doi.org/10.5267/j.msl.2019.5.011

Panuwatwanich, K., & Nguyen, T. T. (2017). Investigating the influence of TQM, service quality and market orientation on customer satisfaction and loyalty in the Indian banking sector. *International Journal of Quality & Reliability Management, 34*(3), 362–377. https://doi.org/10.1108/IJQRM-04-2015-0057

Prajogo, D. I., & Brown, A. (2004). The Relationship between TQM Practices and Quality Performance and the Role of Formal TQM Programs: An Australian Empirical Study. *Quality Management Journal*, *11*(4), 31–42. https://doi.org/10.1080/10686967.2004.11919131

Prajogo, D. I., & Sohal, A. S. (2006). The integration of TQM and technology/R&D management in determining quality and innovation performance. *Omega*, *34*(3), 296–312. https://doi.org/10.1016/j.omega.2004.11.004

Pratama, W., & Sulistyowati, N. (2019). Effect of Quality Management on Knowledge Management and Company Performance at PT XYZ. *International Journal of Latest Research in Engineering and Management (IJLREM), 3*(8), 1-9.

Pushpamali, N. N. C., Agdas, D., Rose, T. M., & Yigitcanlar, T. (2021). Stakeholder perception of reverse logistics practices on supply chain performance. *Business Strategy and the Environment, 30*(1), 60-70. https://doi.org/10.1002/bse.2609

Quang, H. T., Sampaio, P., Carvalho, M. S., Fernandes, A. C., Binh An, D. T., & Vilhenac, E. (2016). An extensive structural model of supply chain quality management and firm performance. *International Journal of Quality & Reliability Management*, *33*(4), 444–464. https://doi.org/10.1108/ijqrm-11-2014-0188

Rasheed, R., & Rashid, R. (2023). Role of service quality factors in word of mouth through student satisfaction. *Kybernetes,* In press. http://dx.doi.org/10.1108/k-01-2023-0119

Rasheed, R., Rashid, A., Amirah, N. A., & Afthanorhan, A. (2023). Quantifying the moderating effect of servant leadership between occupational stress and employee in-role and extra-role performance. *Calitatea*, *24*(195), 60-68. https://doi.org/10.47750/QAS/24.195.08

Rashid, A. & Rasheed, R. (2022). A Paradigm for Measuring Sustainable Performance Through Big Data Analytics–Artificial Intelligence in Manufacturing Firms. *Available at SSRN 4087758*. https://doi.org/10.2139/ssrn.4087758

Rashid, A. (2016). Impact of inventory management in downstream chains on customer satisfaction at manufacturing firms. *International Journal of Management, IT and Engineering*, *6*(6), 1–19.

Rashid, A., & Amirah, N. A. (2017). Relationship between poor documentation and efficient inventory control at Provincial Ministry of Health, Lahore. *American Journal of Innovative Research and Applied Sciences, 5*(6), 420–423.

Rashid, A., & Rasheed, R. (2023). Mediation of Inventory Management in the Relationship between Knowledge and Firm Performance. *SAGE Open, 13*(2), 1–11. https://doi.org/10.1177/21582440231164593

Rashid, A., & Rasheed, R. (2024). Logistics Service Quality and Product Satisfaction in E-Commerce. *SAGE Open*, *14*(1), 1–12. https://doi.org/10.1177/21582440231224250

Rashid, A., Ali, S. B., Rasheed, R., Amirah, N. A. & Ngah, A. H. (2022a). A paradigm of blockchain and supply chain performance: a mediated model using structural equation modelling. *Kybernetes*, *52*(12), 6163-6178. https://doi.org/10.1108/K-04-2022-0543

Rashid, A., Amirah, N. A., & Yusof, Y. (2019). The statistical approach in exploring factors of the documentation process and hospital performance: a preliminary study. *American Journal of Innovative Research and Applied Sciences*, *9*(4), 306-310.

Rashid, A., Amirah, N. A., Yusof, Y., & Mohd, A. T. (2020). Analysis of demographic factors on perceptions of inventory managers towards healthcare performance. *The Economics and Finance Letters*, *7*(2), 289-294. https://doi.org/10.18488/journal.29.2020.72.289.294

Rashid, A., Rasheed, R., & Amirah, N. A. (2023). Information technology and people involvement in organizational performance through supply chain collaboration. *Journal of Science and Technology Policy Management*, In press. https://doi.org/10.1108/JSTPM-12-2022-0217

Rashid, A., Rasheed, R., Amirah, N. A., & Afthanorhan, A. (2022b). Disruptive factors and customer satisfaction at chain stores in Karachi, Pakistan. *Journal of Distribution Science*, *20*(10), 93–103. https://doi.org/10.15722/jds.20.10.202210.93

Rashid, A., Baloch, N., Rasheed, R., & Ngah, A. H. (2024a). Big Data Analytics-Artificial Intelligence and Sustainable Performance through Green Supply Chain Practices in Manufacturing Firms of a Developing Country. *Journal of Science and Technology Policy Management*, In press, https://doi.org/10.1108/JSTPM-04-2023-0050

Rashid, A., Rasheed, R., & Ngah, A. H. (2024b). Achieving Sustainability through Multifaceted Green Functions in Manufacturing. *Journal of Global Operations and Strategic Sourcing*, In press. https://doi.org/10.1108/JGOSS-06-2023-0054

Rashid, A., Rasheed, R., Ngah, A. H., Pradeepa Jayaratne, M. D. R., Rahi, S. & Tunio, M. N. (2024c). Role of Information Processing and Digital Supply Chain in Supply Chain Resilience through Risk Management. *Journal of Global Operations and Strategic Sourcing*, In press. https://doi.org/10.1108/JGOSS-12-2023-0106

Rashid, A., Rasheed, R., Amirah, N. A., Yusof, Y., Khan, S., & Agha, A., A. (2021). A Quantitative Perspective of Systematic Research: Easy and Step-by-Step Initial Guidelines. *Turkish Online Journal of Qualitative Inquiry*, *12*(9), 2874–2883. https://www.tojqi.net/index.php/journal/article/view/6159/4387

Reike, D., Vermeulen, W. J. V., & Witjes, S. (2018). The circular economy: New or refurbished as CE 3.0? – exploring controversies in the conceptualization of the circular economy through a focus on history and resource value retention options. *Resources, Conservation & Recycling*, *135*, 246–264. https://doi.org/10.1108/jmtm-03-2018-0075

Rekha, K., Baskar, B., Srinath, S., & Usha, B. (2018). Plant-growth-promoting rhizobacteria Bacillus subtilis RR4 isolated from rice rhizosphere induces malic acid biosynthesis in rice roots. *Canadian Journal of Microbiology*, *64*(1), 20–27. https://doi.org/10.1139/cjm-2017-0409

Roman, R., Díaz-Ferrán, G., Haas, J., Telsnig, T., Díaz-Alvarado, F. A., Palma-Behnke, R., Kracht, W., Moreno-Leiva, S., Chudinzow, D., & Eltrop, L. (2017). Towards solar power supply for copper production in Chile: Assessment of global warming potential using a life-cycle approach. *Journal of Cleaner Production*, *164*, 242–249. https://doi.org/10.1016/j.jclepro.2017.06.038

Sahoo, S. (2018). An empirical exploration of TQM, TPM and their integration from the Indian manufacturing industry. *Journal of Manufacturing Technology Management*, *29*(7), 1188–1210. https://doi.org/10.1108/JMTM-03-2018-0075

Sehnem, S., Chiappetta Jabbour, C. J., Farias Pereira, S. C., & de Sousa Jabbour, A. B. L. (2019). Improving sustainable supply chains performance through operational excellence: circular

economy approach. *Resources, Conservation & Recycling, 149*, 236-248. https://doi.org/10.1016/j.resconrec.2019.05.021

Senarath, B. T. D. N., Gunarathne, G. C. I., & Fernando, T. S. S. (2020). Impact of total quality management on operational performance. *Peradeniya Management Review, 2*(1), 98. https://doi.org/10.4038/pmr.v2i1.36

Sergi, B. S., D'Aleo, V., Konecka, S., Szopik-Depczyńska, K., Dembińska, I., & Ioppolo, G. (2021). Competitiveness and the Logistics Performance Index: The ANOVA method application for Africa, Asia, and the EU regions. *Sustainable Cities and Society, 69*, 102845. https://doi.org/10.1016/j.scs.2021.102845

Shaharudin, M. R., Govindan, K., Zailani, S., Tan, K. C., & Iranmanesh, M. (2017). Product Return Management: Linking Product Returns, Closed-Loop Supply Chain Activities and the Effectiveness of the Reverse Supply Chains. *Journal of Cleaner Production, 149*, 1144-1156. https://doi.org/10.1016/j.jclepro.2017.02.133

Shun, A., Winter, M., O'Loughlin, E., Hardin, J. A., & Gall, D. Grant. (1994). Structural and functional adaptation following jejunal resection in rabbits: Effect of epidermal growth factor. *Gastroenterology*, *107*(1), 87–93. https://doi.org/10.1016/0016-5085(94)90064-7

Singh, R. K., & Agrawal, S. (2018). Analyzing disposition strategies in reverse supply chains: fuzzy TOPSIS approach. *Management of Environmental Quality: An International Journal*, *29*(3), 427–443. https://doi.org/10.1108/meq-12-2017-0177

Singh, V., Kumar, A., & Singh, T. (2018). Impact of TQM on organizational performance: The case of Indian manufacturing and service industry. *Operations Research Perspectives, pp. 5*, 199–217. ScienceDirect. https://doi.org/10.1016/j.orp.2018.07.004

Sweis, R. J., Ismaeil, A. S. I., & Nasr, A. S. N. A. (2019). The relationship between Total Quality Management (TQM) implementation and organization performance: Evidence from the airlines companies in UAE. *International Journal of Information, Business and Management, 11*(1), 58-79.

Trattner, A., Hvam, L., Forza, C., & Herbert-Hansen, Z. N. L. (2019). Product complexity and operational performance: A systematic literature review. *CIRP Journal of Manufacturing Science and Technology, 25*, 69-83. https://doi.org/10.1016/j.cirpj.2019.02.001

Wall, W. P. (2021). The comparison of TQM practices and quality performance between manufacturing and service sectors. *Polish Journal of Management Studies, 23*(1), 436. https://doi.org/10.17512/pjms.2021.23.1.27

Yama, A., Mukem, A., & Jermsittiparsert, K. (2019). The Mediating Effect of Organizational Culture on the Relationship between Total Quality Management, Entrepreneurial Orientation and Performance : A Case of Thai Universities. *International Journal of Innovation, Creativity and Change, 6*(10), 359–380.

Yazdani, M., Chatterjee, P., Pamucar, D., & Chakraborty, S. (2020). Development of an integrated decision-making model for location selection of logistics centres in the Spanish autonomous communities. *Expert Systems with Applications, pp. 148*, 113–208. https://doi.org/10.1016/j.eswa.2020.113208

Yu, Y., Wang, X., Zhong, R. Y., & Huang, G. Q. (2017). E-commerce logistics in supply chain management: Implementations and future furniture industry perspectives. *Industrial Management & Data Systems, 117*(10), 2263–2286. https://doi.org/10.1108/IMDS-09-2016-0398