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THE RELATIONSHIP OF TQM AND AGILE MANUFACTURING AND ITS IMPACT ON APPAREL MILL PERFORMANCE

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ABSTRACT

Pakistani mills face continuous competition from global competitors to produce quality products and remain responsive to satisfy the demands of international fast fashion retail brands. The required agility due to market pressure forces firms to increase inventory turnover, which results in operations hazards to staff. The mills must mitigate operational hazards by imparting safety training to their personnel handling operations. Top management continuously focuses on increasing apparel mill performance by using different capabilities. Based on the available gap, the goal of this study is to determine the relationship between Agile manufacturing (AM), Total Quality Management (TQM), paired with Operational Safety (OS), training, and moderation of High Management Commitment to the performance of apparel mills. For testing the proposed theoretical model, regression analysis was run on the data collected from 104 Pakistani apparel through an online survey. Results indicate significant relation between TQM, AM, and apparel mill performance, whereas OS has no effect on a dependent variable. The results confirm high management commitment only moderates between TQM and the performance of apparel mills.

***Keywords**: Agile Manufacturing, Total Quality Management, Training, Higher Management Commitment, Apparel Mill Performance.*

INTRODUCTION

Today's fashion consumer is highly concerned about the quality, price, and availability of goods on racks and websites. Customers desire a high-quality product at an affordable price, delivered quickly and at their chosen location. Manufacturers must embrace "Total Quality Management" and "Agile manufacturing methods" to fulfill all client demands in the

world's competitive marketplace. The apparel mills use TQM and agile production processes to enhance performance. The establishment of mills continuously monitored the modifications and assessed how TQM and agile manufacturing affected the organization's performance. A study on TQM and agile manufacturing motivates mills to follow similar strategies to remain competitive.

Developments in the market environment push firms to adopt the agile development methodology. A recently standardized concept of agile manufacturing was promoted as the development paradigm of the twenty-first century (Ahmed & Shah, 2020). This is viewed as the winning method for manufacturers to plan for substantial performance changes in a fiercely competitive market with fast-changing customer demands, allowing them to become national and international leaders. This study's results reveal that agile manufacturing's primary principles are to respond to and utilize them through the strategic application of management and development tools. TQM implementation in Bangladesh's small and medium-sized textile industry remains mostly undocumented. TQM procedures are most prevalent in large multinational corporations. The study is designed to reveal the level of TQM implementation in the industrial sector via a mail-in questionnaire. The garment sector is among the fastest-growing textile industries in the world. The expansion of the performance apparel market can be ascribed to the lifestyle changes of a vast population. Thus, exceptional performance is expected of high-tech materials and clothes. Textile and apparel manufacturing businesses include facilities that turn fiber into fabric and fabric into garments and other textile goods. Although many garment manufacturers rely on individuals to cut and sew pieces of fabric together, today's industries are highly mechanized.

Advanced Production Technologies (ATM), Total Quality Control (TQM), Total Preventative Management (TPM), Just-in-Time (JIT), Six Sigma, and Lean Manufacturing have been discussed in the literature. Organizations implement TQM to earn consumer loyalty, corporate capital, or extensive finance to achieve a competitive advantage over rival enterprises. Through collaborative problem-solving, management commitment, and employee empowerment, TQM also provides significant benefits from better customer focus, connectedness, cooperation, and productivity (Sallis, 2014).

Recent years have seen the rise of the phrase "agile manufacturing" to

characterize businesses that can swiftly adjust to new demands. There is a high need for innovative approaches to product creation in agile manufacturing, which may be created by combining existing, mature component designs with new, tailored designs from a distributed team of experts. A group of academics from Lehigh University's Iaccoca Institute coined the word "agile" in 1991 to define what they saw as crucial to the production process. To be profitable in today's dynamic marketplace, businesses require production lines that adapt quickly to meet customers' ever-changing demands. To thrive in today's volatile, consumer-driven marketplaces, manufacturers need the ability to respond rapidly and effectively to market shifts. Highly customized goods are crucial in today's age of mass production. Agility is the ability to adapt to new circumstances and seize new opportunities quickly.

The key advantages of an agile manufacturing process are the ability to make changes to the system in between products and the addition of new products with no additional capital expenses. Optimal mill functioning depends on ensuring operational security (Inman et al., 2011). Security management is a technique for promoting a culture of safety and high safety performance. Two simple examples illustrate the various conceptions of security management: a safety management agency's plans to promote a healthy safety culture and produce successful safety performance, and the organized security management strategy, which includes administrative structures, accountabilities, policies, and procedures.

The notion of security culture is frequently invoked as a requirement and result of effective safety management, and the fundamental time is highlighted and aligned with other management systems, particularly quality management, is pushed (Yu et al., 2018). Management is a crucial aspect of several sorts of growth, and supply chain partners seek to promote environmentally responsible and sustainable practices. Leadership top management establishes QM objectives and strategies, provides, and allots resources, contributes to improving quality initiatives, and evaluates QM implementation and performance. Engagement of top management is a prerequisite for adopting and executing TQM and is primarily responsible for quality commitment and support activities (Cheung et al., 2010).

The purpose of this study is to determine the influence of agile manufacturing, operational safety, and comprehensive quality management on the performance of a textile mill. It is vital to remember that the most

socially and ecologically responsible factories consistently exhibit superior quality.

Table of Definition

Table 1. Definition of Constructs

The following are the research objectives upon which the research will be analyzed:

- To evaluate agile manufacturing in apparel mills.
- To evaluate TQM in apparel mills.
- To study the moderating effect of higher management between TQM, apparel mill, and mill operational performance.

This study attempts to enhance the performance of textile mills by analyzing the relationship between TQM and agile production. It will give a quantitative framework for addressing the deficit and achieving a sustained performance advantage to compete on worldwide markets for increased exports and foreign currency.

Constructs	Definitions
Total Quality Management **(TQM)**	Quality management tool used for long term success through satisfaction of customers (Eniola et al., 2019).
Agile Manufacturing **(AM)**	Production methodology which focuses strongly on how to respond the customers quickly (Hariyani & Mishra, 2022).
Operational Safety **(OS)**	Protection from risks, dangerous situations which can be from machineries or the surroundings (Samal et al., 2019).
Training	Teaching and guidance of a machine or responsibility (Salazar et al., 2020).
Higher Management Commitment **(HMC)**	The commitment of top management taking important decisions of the organization such as; safety, security, environment, etc (Yusliza et al., 2019).
Apparel Mill Performance **(AMP)**	The performance measures for a apparel mill such as; comfort, strength, etc (Keough & Lu, 2021).

LECTURE REVIEW

Apparel Mill Performance

Numerous attempts have been made to evaluate the clothing factory's efficiency in several methods. The most published performance evaluation methods utilize a limited number of experiments. Many measures have been created during past attempts to develop performance evaluation systems. As

demonstrated, limited research has been conducted on textile and garment production evaluation. This allows for a more thorough examination of industry-relevant performance indicators for the supply chain and garment and textile manager literature. Recognition of the measurements used by textiles and clothing firms may benefit the industry; only by acknowledging the industry's demands can the industry increase academic research funding. Wadho & Chaudhry (2018).

Total Quality Management and Apparel Mill Performance

Total Quality Management (TQM) is a commonly used term in business and academics, although its philosophical foundation remains unclear. To comprehend TQM, it is necessary to examine what its pioneers intended to teach us and how TQM relates to their guiding ideas and suggestions. The leaders of the TQM movement include Edwards Deming, Josef Juran, and Kaoru Ishikawa Sallis et al. (2014).

According to Honarpur et al. (2012), TQM is a framework for customer-centric management that engages all employees in quality development. Current quality control systems, the successor to TQM, incorporate all these concepts. Total Quality Management (TQM) is a continual method for identifying and minimizing or correcting manufacturing faults, optimizing supply chain operations, enhancing customer service and keeping training employees current.

According to Oakland (2014), although TQM originated in the construction business, its ideas may be applied to various industries. In this regard, TQM is utilized in several areas, including but not limited to development, banking, finance, and health. This aids all employees in attaining the organization's goals and enhancing their productivity in any field. Participating departments may include management, marketing, engineering, and employee preparedness. TQM is an integrated management concept for continually enhancing the quality of goods, productivity, customer happiness, and firm profitability. Kayank (2003) discovered a favorable relationship between TQM and organizational performance. (Neena Sinha & Dhall, 2016) discovered that TQM and quality concepts contribute to SME organizational performance. So, the proposed theory is as follows:

H1: *TQM has a positive and significant relationship with Organizational performance.*

Manufacturing agility and Apparel Mill Performance

According to Inman et al. (2011), a team of researchers from the Laccoca Institute at Lehigh University coined "Agility" as a manufacturing phrase in 1991 to describe the activities seen in their study and regarded as fundamental characteristics of manufacturing. The study's outcome was a two-volume report that outlined an industry-led vision for a potential paradigm shift in manufacturing. The research focused on how the United States may recover its productive preeminence. It recognized the United States, Western Europe, and Japan's efforts to construct an economic ecosystem to assure competitiveness in the growing international development order. It was suggested that, if adopted, the agile technique in manufacturing would enable the United States to restore its leadership position in development. The report discusses agile development organizations, materials, facilities, and operational frameworks. The research was a revolutionary effort enthusiastically received by academics, commentators, and government officials. According to Pan and Nagi (2010), there was already a previously unidentified agility, and the underlying concept needed to be developed. Considering the many groups, the effort did not, for example, combine society or philosophy.

According to Pan & Nagi (2010) and Inman et al. (2011), the primary catalyst for agility changes. This section discusses the changing performance circumstances that led to the emergence of a vast array of competing standards. To create a comprehensive plan execution strategy, a comprehensive grasp of modern development standards is required. Automation and price/cost assessments, increasing customer choice and preferences, strategic goals, development and operation, and synergistic fulfillment of production criteria are covered below. Demand and incapacity to provide were high in the postwar period, resulting in backlogs of customer demands. Consumer preferences have been determined mainly by price, and mass manufacturing of goods has enabled the automation of industrial operations. The automation has been flexible and static.

AM is a technique or strategy that focuses on responding rapidly to the requirements of consumers while preserving and not compromising quality standards and limiting the expenses associated with the operational performance of a particular product, resulting in customer satisfaction. Agile manufacturing (AM) has had a direct and favorable influence on company performance, whereas OP aspects like cost, quality, delivery, and flexibility

indirectly affect AM (Nabass & Abdallah, 2019). Agile Manufacturing is positively correlated with Firm performance, operational performance, and JIT, resulting in enhanced financial and operational performance (Inman et al., 2011). So, the proposed theory is as follows:

H2: *Agile Manufacturing has a positive and significant relationship with Organizational performance.*

Training and Apparel Mill Performance

According to Lathman (2012), formal and informal training preparation may be classified. Formal training refers to standardized programs that recipients and suppliers can identify to build new understanding or knowledge of the job or business process. In contrast, informal training is ad hoc, fragmented, and versatile, frequently lacking formal structure and objectives. In other words, informal training can be provided by either senior staff or a non-formally constituted business. Micro- and small-sized businesses favor informal training over formal certification. A systematic training technique there are several reasons why small organizations do not frequently seek it. This is due to expensive training expenses, ample formal education alternatives, and a lack of relevance to the workforce. Lathman, (2012). (2012). According to Elnaga and Imran (2011), informal training allows workers to learn informally by asking questions and getting advice from other staff members and supervisors, resulting in better working relationships. Other findings also imply that the working environment of small enterprises that encourages high levels of efficiency, profitability, and quality is more compatible with informal training. Blume et al. (2010). Lathman, (2012). Different techniques for preparing are seen differently. They believe that formal training makes it much easier to assess the effectiveness of organizational performance training since the cost and benefits of time and investment training techniques can be quantified and documented with relative ease. Formal approaches to on-the-job training are more customized to the requirements of employers. According to Blume et al. (2010), firms are more likely to stress formal training if their organizational structure (standard rules, procedures, and policies) and delegation are highly structured. Similar claims are made by other academics, stating that hierarchical companies offer their employees more opportunities for formal training. Informal training appears more appropriate for organizations with less hierarchical structures and fewer official management positions. Elnaga & Imran (2011).

Researchers have shown that training programs may be utilized to prevent the failure of small and medium-sized businesses. Lathman, (2012). (2012). Other financial indicators identified by Elnaga and Imran include "market" and "value-based" measurements (2011).

Training improves employee performance, and no sector should shun it. A training program enables you to enhance each employee's abilities to develop and its beneficial impact on operational performance. There is a favorable relationship between training and organizational performance, and boosting employees' skills, knowledge, and abilities, as well as their dedication to the business, substantially impacts productivity (Daniel, 2018). Mara Isabel et al. (2014) discovered a correlation between training and the performance of an organization.

H3: *Training has a positive and significant relationship with Organizational performance.*

Operational Safety and Apparel Mill Performance

Two primary examples illustrate the numerous conceptions of security management: plans made by the safety management agency to foster a healthy security culture and achieve good safety results Helmreich et al., (2017). Organizational safety management strategy, with required administrative processes, accountabilities, policies, and procedures. In the first definition, safety management is known to be a tool for many reasons, primarily to promote a safety culture and good safety results. According to Fan & Zohu (2018), a principle of security culture is always evoked as a requirement and consequence of effective safety management. The introductory period of the plan-do-check-act is stressed, and alignment with other management systems is encouraged for organizational processes needed in the safety management systems, particularly quality management Rae et al., (2018). In addition to the several concepts, there are collections of protection elements. The following list can be found in the various works of literature as a universal denominator:

- Safety policy.
- Resources and duties for safety.
- Identification and mitigation of risks.
- Procedures and standards.

- Design of systems based on human aspects.
- Safety instruction
- Performance monitoring of safety
- Reporting and investigating incidents.
- Auditing.
- Constant improvement.
- Administration of change

Fan & Zohu (2017) argue that all safety management frameworks should apply the primary standard. However, various organizational and environmental factors can influence its unique design and implementation.

Three aspects of businesses and their environments directly affect how security may and should be managed. In order, here they are:

1. The type of security to be administered: procedure vs. individual security.
2. The broad approach to managing vulnerability is an essential part of safety management organizations: minimizing vulnerability instead of dealing with it.
3. The safety protection regulatory regime: external control vs. self-regulation.

For each attribute, juxtapositions are utilized to categorize distinguishing characteristics within attributes. For instance, process and personal protection are essential to most firms, and rules frequently combine external and self-regulation. Helmerich et al (2017).

Sustainable organizations attempt to strike a balance between people, the planet, and profit to achieve long-term success. This implies that companies cannot be viable if they fail to protect their most asset employees' safety, health, and welfare. It may facilitate a strong relationship and bond with the buyer, a beneficial influence on mill performance, and staff dedicated to the business. Vassie and Lucas (2001) contend that workers cannot readily accomplish safety measures without appropriate management engagement. Amponsah-Tawiah and Mensah (2016) discovered a correlation between occupational health and safety management and employee engagement in the business.

H4: *Safety Operation has a positive and significant relationship with Organizational performance.*

Moderation of Higher Management Commitment

The effectiveness of TQM is mainly dependent on the commitment of upper management. The importance of upper management commitment results in the effective implementation of TQM (Soltani et al., 2005). Bou and Beltrán (2007) discovered that TQM and a high-commitment approach had a favorable and substantial relationship with organizational and financial success. High commitment moderates the relationship between Total Quality Management and organizational success.

H5: *Higher Management Commitment has a moderating effect on the relationship between Total Quality Management and Apparel Mills' Performance*

Agile Manufacturing combines personnel, customers, and technology to swiftly and efficiently meet customers' changing needs and wants. They respond rapidly and effectively to client requirements by targeting and adopting tactics for unpredictable circumstances (Muralidar, 2015). The consensus about the implications of agile manufacturing's hurdles and their link to these obstacles (Hasan et al., 2007).

H6: *Higher Management Commitment moderates the relationship between Agile manufacturing and Apparel Mills' Performance.*

Without safeguarding the safety, health, and welfare of their most valuable assets, organizations cannot endure. Amponsah-Tawiah and Mensah (2016) discovered a correlation between occupational health and safety management and employee engagement in the business. Empirical evidence indicates a favorable association between management safety commitment and safety compliance and engagement (Mashi et al., 2018).

H7: *Higher Management Commitment moderates the relationship between Operational Safety and Apparel Mills' Performance.*

Tan & K (2012) found a positive relationship between training and organizational performance through the involvement of senior management commitment. María Isabel et al. (2014) found a positive association between training and organizational performance.

H8: *Higher Management Commitment moderates the relationship between Training and Apparel Mills' Performance.*

Proposed Theoretical Model

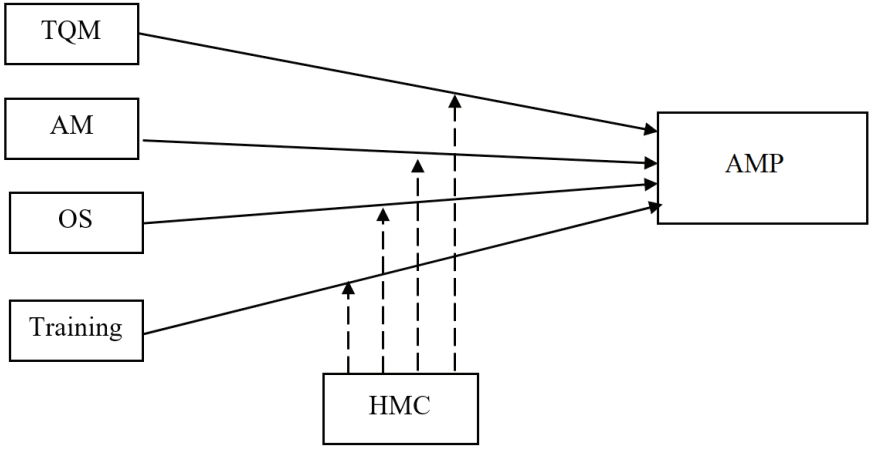

Figure 2.1: *Propose Theoretical Model*

Total Quality Management (TQM), Agile Manufacturing (AM), Operational Safety (OS), Training, Higher Management Commitment (HMC), and Apparel Mill Performance (AMP)

METHODOLOGY

Ontology, epistemology, methodology, and the research study technique may be considered the four assumptions upon which a paradigm is founded. This research is founded on positivist (scientific paradigm) or quantitative methodology. In the positivist paradigm, the researcher emphasizes that reality exists in nature based on ontological assumptions. The assumptions underlying epistemological arguments are that the researcher will discover and investigate the reality or phenomenon that needs to be investigated. The third premise of the positivist approach is that the methodology should be highlighted to describe the researcher's goal, course of action, and techniques, including the means or procedure to analyze the data obtained from respondents. In the current research study, the researcher begins with a deductive technique for data analysis and then transitions to an inductive strategy for interpreting the results. This study employs a positivist paradigm-based methodology.

The private Apparel Factories in Karachi, Pakistan, are the focus of this research. Our study shows that the private sector is the best setting for assessing Apparel Mill Performance, which is influenced by Total Quality Management, Agile Manufacturing, Operational Safety, and Training,

with Greater Management Commitment playing the moderating role. The organization is the unit of study, and data were acquired from its personnel, who are knowledgeable about the rules and procedures of the company. Our sample comprises 104 individuals from various departments (based on the regression assumption of Hair et al. 2007, 5 respondents against one measured item). Our research project employed non-probability sampling and the convenience sample approach to target the population. Sample Size, Sampling Technique: Using a 5-point Likert scale, we designed a questionnaire to collect raw data (Strongly disagree 1, Disagree 2, Neutral 3, Agree 4, and Strongly Agree 5). This questionnaire consists of well-considered questions, with a total of 27 items divided into six sections:

Part 1 consists of total quality management measures and questions adopted from the study of Flynn et al. (1995).

Part 2 considers agile manufacturing and all its contents and questions adopted from the study of Inman et al. (2009).

Part 3 focused on operational safety measures by adopting the scale of Xianguo et al. (2013)

Part 4 focused on training measures by adopting the scale of Niazi (2011).

Part 5 consists of higher management commitment measures, questions adopted from the study of Sanjay et al. (1997)

Part 6 considers apparel mill performance and all its contents, questions adopted from the study of Zelbst et al. (2009)

We utilized Statistical Package for the Social Sciences (SPSS) to evaluate the data obtained from this study's respondents. We performed descriptive, reliability, correlation, and regression analyses to determine the relationship between the research variables.

RESULTS

This section investigates the influence of Total Quality Management, Agile Manufacturing, Operational Safety, and Training on Apparel Mill Performance, using Higher Management Commitment as a moderator.

Descriptive Statistics

The descriptive analysis summarizes the values of research variables, including sample size, maximum and minimum values, mean and standard

deviation, and the number of respondents. In table 4.1, the variable's name appears in the first column, the number of respondents in the second column, the lowest and maximum values in the third and fourth columns, and the mean and standard deviation in the fifth and sixth columns, respectively.

Table 4.1 Descriptive Statistics

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Total Quality Management	104	2.33	5.00	4.35	.48
Agile Manufacturing	104	2.75	5.00	4.23	.56
Operational Safety	104	2.33	5.00	4.25	.58
Training	104	1.67	5.00	3.99	.78
Higher Management Commitment	104	1.50	5.00	4.11	.63
Apparel Mill Performance	104	2.25	5.00	4.19	.57

Table 4.1 displays the list of research variables and the statistically significant values. The first column of the table contains the names of the variables, the second column has the sample size, and the third, fourth, fifth, and sixth columns contain, respectively, the minimum, maximum, mean, and standard deviation. In this study, the 5-point Likert scale was utilized. The independent variables include Total Quality Management, Agile Manufacturing, Operational Safety, Training, Higher Management Commitment, Apparel Mill Performance, and Training. This study's moderating variable, training, has a mean value of 4.11 and a standard deviation of 0.63.

Reliability Analysis

Table 4.2: Cronbach's Alpha

Variable	Cronbach's Alpha	No. of Items
Total Quality Management	.832	09
Agile Manufacturing	.739	04
Operational Safety	.748	03
Training	.808	03
Higher Management Commitment	0.818	04
Apparel Mill Performance	0.768	04

Table 4.2 demonstrates that the Cronbach Alpha reliability of the research variables is adequate, with no variable having Cronbach alpha reliability below the industry norm of 0.70. Overall Quality Management, Agile Manufacturing, Operational Safety, Training, Increased Management

Commitment, Apparel Mill Performance, and More have appropriate alpha coefficient values.

Correlation Analysis

The level of significance and the direction of the association between variables is demonstrated by correlation analysis. Pearson correlation analysis determines the correlation coefficient, which spans from +1.00 to -1.00. The number 0 indicates no correlation between the variables under examination.

Table 4.3 Correlations

Variables	**1**	**2**	**3**	**4**	**5**	**6**
Total Quality Management	1					
Agile Manufacturing	.634**	1				
Operational Safety	.507**	.452**	1			
Training	.666**	.556**	.462**	1		
Higher Management Commitment	.519**	.526**	.611**	.624**	1	
Apparel Mill Performance	.756**	.665**	.513**	.729**	.583**	1
** Correlation is significant at the 0.01 level (2-tailed).						

Total Quality Management, Agile Manufacturing, Operational Safety, Training, Higher Management Commitment, and Apparel Mill Performance are analyzed for correlation in Table 4.3. Positive and substantial correlations exist between Operational Safety and Training (r=.462, p.01), Greater Management Commitment (r=.611, p.01), and Apparel Mill Performance (r=.513, p.01). Greater Management Commitment is positively and significantly connected with training (r=.624, p.01) and Apparel Mill Performance (r=.729, p.01).

Regression Analysis

Regression analysis investigates how much an independent variable influences a dependent variable. In contrast to correlation analysis, which merely examines the influence of one variable on another, regression analysis explains the ability of an independent variable to produce a change in the dependent variable.

Table 4.4. Regression analysis for direct effect

Variables	B	SE	T	P
TQM ⟶ AMP	.42	.35	4.22	.000
AGILE ⟶ AMP	.22	.33	2.95	.004
OS ⟶ AMP	.07	.07	1.19	.235
TR ⟶ AMP	.24	.33	4.34	.000

TQM= Total Quality Management, AGILE= Agile Manufacturing, OS= Operational Safety, TR= Training, AMP= Apparel Mill Performance

Table 4.4 depicts the direct influence of the study's independent factors on the dependent variable. Overall, Quality Management has a substantial and positive link with Apparel Mill Performance (B=.42, p.05), as seen in the table. This indicates that our investigation's outcomes support the study's initial hypothesis. This indicates that the study's results refute the third hypothesis of the study. This indicates that the data likewise support the fourth hypothesis of the research. This indicates that the data likewise support the fourth hypothesis of the research.

Table 4.5. Regression analysis for Moderation of Higher Management Commitment

Variables	B	SE	T	P
TQM*HMC ⟶ AMP	.05	.40	4.22	.04
AGILE*HMC ⟶ AMP	.02	.20	1.26	.21
OS*HMC ⟶ AMP	-.03	-.236	-1.79	.07
TR*HMC ⟶ AMP	.04	.40	2.72	.00

TQM= Total Quality Management, AGILE= Agile Manufacturing, OS= Operational Safety, TR= Training, AMP= Apparel Mill Performance

Table 4.5 describes the moderator impact on the dependent variable. To determine the influence of moderation on the dependent variable, we must first calculate the interaction between the independent variable and the moderator. In SPSS, we must multiply the independent variable by the moderator and then examine its impact on the dependent variable. If the direct effect is significant and remains significant after placing a moderator, then it moderates the relationship between the independent and dependent variables. If the direct effect becomes insignificant, then the moderator is not moderating the relationship between the independent and dependent variables.

Table 4.5 demonstrates that the association between Overall Quality Management and Apparel Mill Performance remains significant (B=.05, p.05) when controlling for the moderator. Greater Management Commitment moderates the relationship between Total Quality Management and Garment Mill Performance. The findings corroborate hence H5 of the study, which states that Greater Management Commitment moderates the direct effect of Total Quality Management on Apparel Mill Performance.

After installing the moderator, the association between Agile

Manufacturing and Apparel Mill Performance is no longer significant (B=.02, p>.05; Table 4.5). This demonstrates that Greater Management Commitment has no moderating influence on the direct relationship between Agile Manufacturing and Apparel Mill Performance. The study findings do not support the hypothesis that Greater Management Commitment moderates the direct effect of Agile Manufacturing on Garment Mill Performance (H6).

After installing the moderator, the connection between Operational Safety and Apparel Mill Performance remains negligible (B= -.03, p>.05), as shown in Table 4.5. This demonstrates that Greater Management Commitment has no moderating influence on the direct relationship between Operational Safety and Garment Mill Performance. The study findings do not support the hypothesis that Greater Management Commitment moderates the direct effect of Operational Safety on Garment Mill Performance (H7).

After putting the moderator, the connection between Training and Apparel Mill Performance remains significant (B=.04, p.<.05), as shown in Table 4.5. This demonstrates that Greater Management Commitment modifies the relationship between Training and Apparel Mill Performance. Hence, the study's hypothesis H 8 shows that Greater Management Commitment moderates the direct relationship between Training and Textile Mill Performance is validated by the data.

Table 4.6: Summary of Hypothesis

No.	Hypothesis Statement	Supported/ Not Supported
H1	Total Quality Management is a significant positive relationship with Apparel Mill Performance	Supported
H2	Agile Manufacturing is a significant positive relationship with Apparel Mill Performance	Supported
H3	Operational safety is a significant positive relationship with Apparel Mill Performance	**Not Supported**
H4	Training is a significant positive relationship with Apparel Mill Performance	**Supported**
H5	Higher Management Commitment moderates the relationship between Total Quality Management and Apparel Mill Performance	**Supported**
H6	Higher Management Commitment moderates the relationship between Agile Manufacturing and Apparel Mill Performance	**Not Supported**
H7	Higher Management Commitment moderates the relationship between Operational Safety and Apparel Mill Performance	**Not Supported**
H8	Higher Management Commitment moderates the relationship between Training and Apparel Mill Performance	Supported

Discussion, Conclusion, Recommendations and Limitations

The study's first hypothesis was that Total Quality Management has a substantial positive link with Apparel Mills' performance, which is verified by our study data and confirmed by previous research on the issue. The second hypothesis of this study is that there is a substantial positive correlation between Agile Manufacturing and Apparel Mills' Performance, and the results indicate that this is confirmed by the study data and is consistent with previous research. The third hypothesis of the current study investigates whether Operational Safety has a substantial positive connection with Apparel Mill's Performance; however, the results indicate that this hypothesis is not supported by the study data and is inconsistent with previous research. The fourth hypothesis of the current study is that training has a strong positive relationship with Apparel Mills' Performance, and the results indicate that this is confirmed by the study data and is consistent with previous research. The fifth hypothesis of the current study is that Greater Management Commitment moderates the link between Overall Quality Management and Apparel Mills' Performance. The results indicate that this hypothesis is confirmed by the study data and is consistent with previous research. The sixth hypothesis of the present study investigates whether Higher Management Commitment moderates the relationship between Agile Manufacturing and Apparel Mills' Performance; however, the results indicate that this hypothesis is not supported by the study data and is inconsistent with previous research. The seventh hypothesis of the present study investigates whether Greater Management Commitment moderates the link between Operational Safety and Apparel Mills' Performance. The results indicate that the data does not support this hypothesis and is inconsistent with previous research. The eighth hypothesis of the present study is that Greater Management Commitment moderates the link between Training and Apparel Mills' Performance. The results indicate that this is confirmed by the study data and is consistent with previous research.

CONCLUSION

This study's objective is to determine the effect of Total Quality Management, Agile Manufacturing, Operational Safety, and Training on the performance of apparel mills. All the direct hypotheses of the study are validated by the data of the current investigation, except for the link between operational safety and apparel mill performance. Conversely, Greater Management Commitment

moderates the relationship between Total Quality Management and Training and Apparel Mills' Performance; it does not moderate the relationship between Agile Manufacturing and Operational Safety.

Our scope will be exporting apparel mills and their operational departments.

- We have faced time constraints in this research as our research topic demands in-depth study.
- We faced problems in gathering data.
- We won't be able to do physical implementation in the industry due to the consequences of COVID-19.
- Due to the unavailability of funds, our primary focus will be apparel mills in Karachi.

Implications and Recommendations

The current study is conducted on the Apparel industry of Pakistan, which is a highly significant sector because Pakistan is an agriculture-based nation, and the majority of its population is employed in that area. This work has several theoretical and practical consequences. This work contributes to the theory by offering fresh insights into the current theory, so significantly enhancing it.

Practical Implications

They must have maintained their understanding of Total Quality Management, Agile Manufacturing, and Training, as these are the most critical factors influencing the success of apparel mills. They must have considered the Higher Management Commitment, as it plays a vital moderator function in the link between Total Quality Management, Training, and Garment Mill Performance.

Limitations and Future direction

The research study has a lot of limitations since no study is without constraints. Because of time constraints, the number of Apparel Mills considered in this study is restricted. Time restrictions also limited the size of the sample pool. This research was likewise restricted to the Karachi Textile Mills. In the future, the Apparel Mills research could incorporate more data from Pakistan's other apparel mills. We only collected all the data at

once; therefore, this study is cross-sectional; in the future, we must acquire longitudinal data to enrich the study. In the future, additional mediators and moderators must be added to the present framework to examine other variables in the proposed model.

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