Strategic Ingredients for Innovation: The Mediating Role of Knowledge Management and the Moderating Role of Management Support in Organizational Culture

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Arslan Aslam[1], Muhammad Usman Awan[1], Ahmad Sohail Lodhi[2]

Abstract

This study examines the impact of administrative culture, specifically adhocracy, clan, market, and hierarchy cultures, on product innovation in modern businesses. This study utilizes a survey-based method and employs structural equation modeling (SEM) to investigate the proposed hypotheses thoroughly. The research framework includes two essential elements: knowledge administration as a mediator and management support as a moderator to clarify the dynamics involved. Findings reveal a positive impact of organizational culture in terms of adhocracy, clan, and hierarchy culture on product innovation, except for market culture. Besides, knowledge management positively mediates the association between administrative culture as well as product origination. Also, management support positively moderates the relationship between knowledge management and product innovation. This study improves our understanding of the complicated connection between workplace atmosphere and new product development through a comprehensive survey and SEM analysis. Additionally, it offers practical suggestions for organizational leaders who aim to cultivate a culture that promotes ongoing innovation. The findings augment the expanding reservoir of knowledge in the realm of administrative comportment and innovation management, providing valuable discernment for both academic researchers and industry professionals.

Keywords: Organizational culture, knowledge management, product innovation, management support.

INTRODUCTION

The association between workplace culture as well as innovation has sparked rising study focus across various fields and regions, notably in industrialized countries (Büschgens et al., 2013; Yun et al., 2020). However, the amount of research specifically focused on this topic is still limited in the specialized literature, especially when it comes to small businesses in developing countries, particularly in Pakistan (Shahzad et al., 2017). A lack of understanding about emerging countries may lead to the false belief that the findings drawn for industrialized countries in this area are equally valuable to nations in emerging regions. Nonetheless, innovation has varied characteristics and features at various levels of the invention process. As a result, organizational culture can have varying effects on organizations' innovation in different situations (Zhang et al., 2023).

Compared to enterprises in industrialized countries, organizations in emerging nations demonstrate a lesser predisposition toward innovation, receive less governmental backing, and have fewer positive externalities resulting from the atmosphere (Du et al., 2017). These drawbacks lead to the development of incremental innovations, which are frequently not fresh to customers but are novel to the company. This form of invention is referred to as "new-to-firm innovation" (OECD/EC, 2005). This is a kind of organization that is intimately connected to the organization's capability to incorporate technology, allowing it to be at the forefront of technological efficiency. However, in mature and innovation-driven economies, revolutionary and innovative disruption is common. This form of innovation extends to the marketplaces in which the corporation runs, as well as on a global level, referring to the terms "new-to-market" and "worldwide innovations"(OECD/EC, 2005). The nature of innovation differs among economies with differing levels of development, which can influence how organizational culture promotes innovation. Different levels of progress in countries might result in multiple results in the field of innovation simply because of the influence of a specific organizational culture (Cao et al., 2025).

Previously, most research focused on investigating a single dominant culture inside an organization (e.g., Scaliza et al., 2022; Shahzadi, 2017), ignoring the dynamics that develop when many cultures exist simultaneously. There is a conspicuous lack of study that investigates the coexistence of clan, partisanship, hierarchical, and market customs in a company and their combined impact on product creation. It is critical to close this gap with the goal to gain a better sympathetic of the intricate relationships among diverse cultural aspects and the cumulative effect they have on innovation efforts.

Furthermore, previous research has acknowledged the reputation of information administration in the domain of origination (Adeinat & Abdulfatah, 2019; Azeem et al., 2021), emphasizing its role in facilitating knowledge generation, dissemination, and utilization within organizations. Despite the fact that information management as well as organizational culture are well recognized, the majority of research treats them as separate concepts, ignoring their intricate relationship. To better understand how information administration performs in buffering the influence of workplace culture on innovative products, this research gap must be filled.

[1] Institute of Quality & Technology Management, University of the Punjab, Lahore. Corresponding author Email: arslan.iqtm@pu.edu.pk
[2] Department of Business Education, Institute of Education & Research, University of the Punjab, Lahore.

Additionally, the existing body of literature frequently falls short of providing a comprehensive analysis of how different facets of organizational culture relate to other facets of information administration in the novelty generation process. Different knowledge management systems may be required for different cultural typologies in order to optimize their influence on innovation outcomes (Abdelrahman et al., 2025).

Even though the connection between information administration as well as product innovation has been extensively studied, little is known about how managerial support affects this relationship (e.g. Inkinen et al., 2015; Shujahat et al., 2019). Earlier research has consistently emphasized the concern of information administration in facilitating origination processes within organizations, highlighting its role in knowledge creation, sharing, and application. Nevertheless, the extent to which management support acts as a crucial contextual element that can potentially affect the intensity and characteristics of the correlation between information administration and product innovation hasn't been adequately considered. The current body of research commonly recognizes the overall importance of leadership support and managerial encouragement in cultivating an environment conducive to innovation. However, there is a shortage of detailed analyses regarding how variations in the extent and characteristics of managerial support may influence the efficacy of knowledge management initiatives in promoting product innovation. Therefore, the study posits essential questions: 1) What is the impression of altered dimensions of organizational culture on product innovation? 2) How does information management intervene in the link between administrative culture and product innovation, and 3) what is the role of management support in the relationship between organizational culture and product innovation?

This research enhances existing organizational culture theory by deepening our comprehension of how specific cultural dimensions impact the outcomes of product innovation. The study enhances theoretical models of organizational culture by analyzing the distinct traits of clan, adhocracy, hierarchical, and market cultures. This approach provides a more thorough knowledge of the ways in which specific cultural characteristics impact the innovation process. This deepens our theoretical sympathetic of the complex and diverse aspects of organizational culture and how it can either promote or impede innovation.

Furthermore, incorporating knowledge management as an interceding factor in the correlation among organizational culture and product innovation adds value to the existing body of research on innovation. This theoretical framework acknowledges that corporate culture has a gradual impact on innovation, operating from the standpoint of knowledge management procedures. The learning recognizes information administration for being a mediating process, which improves on existing models of innovation. It emphasizes how important knowledge-related activities are in transforming cultural influences into concrete, creative outcomes.

Lastly, we are better able to understand the appropriate aspects that affect the effectiveness of the interaction inside the context of corporate culture, knowledge management, and product innovation when we include leadership support as a moderating component. This modification recognizes that the impression of innovation on administrative culture depends on the category and level of managerial assistance. By elucidating the crucial part that leadership plays in shaping the innovation climate throughout trades, the theoretical framework advances ideas of management and leadership.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Knowledge-Based View

The function of workplace culture in determining the efficacy of product control as well as product innovation within a corporation is of the highest importance. The idea of the knowledge-based view (Kogut & Zander, 1992) offers a significant conceptual framework for comprehending the interconnections between these elements and the character of knowledge management as a mediating factor (Caputo et al., 2019). Primarily, organizational culture establishes the framework within which an organization places importance on quality. A society that places a high emphasis on quality as a fundamental principle is more inclined to adopt stringent quality management protocols. In a workplace environment characterized by such cultural norms, employees demonstrate a greater propensity to conform to established quality standards, consistently strive for enhancement, and adopt a proactive stance in recognizing and resolving quality-related concerns (Shuaib & He, 2021). The unwavering dedication to quality inside the organization cultivates an atmosphere that also promotes product innovation, as it frequently necessitates a steadfast commitment to excellence and ongoing enhancement.

2.2 Organizational Culture and Knowledge Management

Research has shown a major affiliation between workplace culture and intellectual management. Zheng (2009) introduced a theoretical framework that classifies cultural variables into three groups: knowledge, individuals, and labor. Each cultural category has a specific impact on knowledge management, affecting its effectiveness, efficiency, and sustainability in various ways. Fostering a cultural environment that prioritizes the exchange of ideas is crucial for the accomplishment of knowledge management projects. De Long and Fahey (2000) explored the dimensions through which organizational culture influences and directs the behaviour of knowledge sharing. They concluded that organizational culture shapes fundamental ideas regarding the importance of knowledge and provides the context for social interactions. Lopez et al. (2004) underlined how crucial it is to take into account the social circumstances in which knowledge exchange occurs.

A corporate culture that actively fosters knowledge management has the potential to yield more efficient and successful outcomes. McManus and Loughridge (2002) emphasized the importance of implementing a standardized and protected information culture in facilitating the achievement of organizational objectives. Edvinsson and Sullivan (1996) acknowledged the relevance of tradition in the efficient administration of knowledge.

There are four prevalent organizational tradition forms: clan, adhocracy, consumers, and structure. Every type has different effects on the practice of knowledge management, often resulting

in favorable consequences. Clan culture promotes the exchange and advancement of knowledge (Shahzadi, 2017); adhocracy culture cultivates creativity and ongoing learning (Zeraatkar et al., 2020); market culture emphasizes efficiency and competitiveness (Pinho et al., 2014), and hierarchy culture provides organized and compliant knowledge management (Tseng, 2011). Organizations can gain advantages by understanding their predominant cultural type and using it to augment their knowledge management endeavors in ways that are congruent with their objectives and principles.

H1a: Workplace culture, specifically clan culture, is favorably connected with the handling of knowledge.

H2b: The environment of an organization has an upbeat association with the administration of knowledge.

H3c: Organizational culture as it pertains to the economy is favorably correlated to knowledge administration.

H4d: Organizational culture, specifically hierarchy culture, is favorably correlated with knowledge management.

2.3 Knowledge Management and Product Origination

The association between intellectual administration practices and origination is a complex and insufficiently researched domain, especially in developing nations. Current studies often overlook subtle variations in innovation forms and disparities between industries. Knowledge management strategies encompass the numerous methods, projects, and activities implemented by enterprises to gather, move, apply, and save information. Du Plessis (2007) highlights the value of knowledge as well as knowledge administration in fostering innovation by making it easier to codify and share implicit knowledge. The implementation of efficient knowledge management practices contributes to an institute's efficacy to innovate, as supported by Darroch and McNaughton (2002) and Donate and Pablo (2015). Knowledge management methods also serve as intermediaries in linking diverse aspects to the consequences of the development. According to Abou-Zeid, as well as Cheng (2004), the compatibility of information alteration actions, as well as the category of information connected with origination, can have a substantial impact on the potency of the innovation process.

Nonetheless, a piece of recent corpus research presents a varied picture of the affiliation between origination efficacy and knowledge management. Some research suggests that not all knowledge management approaches exhibit a direct correlation with innovation performance, while others suggest that each aspect of knowledge has a beneficial role in enhancing organizations' innovation performance (Sobaih et al., 2025). The augmented quantity of available knowledge within a company can heighten the intricacy of the innovation process, as the management of an increasingly vast array of knowledge resources can pose its own set of difficulties. Mardani et al. (2018) also provide evidence supporting the notion that knowledge management activities have a direct influence on both innovation and organizational performance.

This study aims to report this research vacuum by investigating diverse knowledge management techniques and their potential integration to augment organizations' innovation capacities. It identifies several crucial knowledge management practices as fundamental elements that can exert a substantial influence on firm origination, suggesting that the execution of knowledge management approaches will have a direct effect on the innovation outcomes of service-oriented organizations.

H2a: Knowledge management is positively linked with product innovation

H2b: Knowledge management mediates the link between organizational culture (band, adhocracy, marketplace, as well as hierarchy) and product innovation.

2.4 Organizational Culture and Product Innovation

An empirical learning adds to the frame of findings supporting the link between culture as well as creativity. Several studies have demonstrated empirical data suggesting a robust as well as statistically significant causal link between organizational culture as well as the outcomes of innovation (Martins & Terblanche, 2003; Zeraatkar et al., 2020). Nevertheless, the existing body of literature has yet to provide a conclusive answer about the precise sorts of organizational cultures that are more inclined to facilitate or impede innovation. To bridge this existing void, researchers frequently resort to theoretical frameworks like the Competing Values Framework (CVF), as suggested by Cameron, as well as Quinn (2011). Although there are other typologies of structural culture, the CVF distinguishes itself as a highly prevalent paradigm that provides a good instrument for examining the intricate ways in which diverse cultural orientations impact an organization's capacity for innovation.

Organizational culture significantly impacts a company's values, habits, and work environment. Clan culture, characterized by a familial atmosphere, emphasis on collective effort, and employee welfare, promotes strong interpersonal connections, transparent communication, and a shared sense of inclusion (Azevedo et al., 2021). This culture can significantly influence product innovation. In a clan culture, employees collaborate closely, leading to creativity and a unified atmosphere. This fosters a sense of belonging and shared values, motivating employees to align their efforts with the administration's purposes. A sense of ownership and responsibility towards the organization's success encourages more effort and creative efforts towards product improvement (Nanyangwe et al., 2021). The familial ambience encourages risk-taking, innovation, and adaptation to evolving conditions.

Adhocracy culture is a model that emphasizes flexibility, innovation, risk-taking, and individual empowerment. It motivates employees to explore novel concepts and question established norms, fostering creativity and innovation (Zeb et al., 2021). Adhocracy encourages entrepreneurship and collaboration, allowing employees to question norms and develop innovative products (Gorzelany et al., 2021). It also promotes open communication and cross-functional teams, resulting in the creation of original ideas and groundbreaking products. However, achieving equilibrium within an adhocracy society requires structure and strategic alignment to ensure innovation aligns with the organization's goals and market demands. Excessive disorder or lack of concentration can hinder product innovation. Besides, when a firm successfully cultivates a market culture, it can significantly enhance product innovation through many means. Firstly, it fosters a mentality of ongoing enhancement, motivating

staff to actively pursue inventive resolutions to address the ever-changing demands of clients (Azeem et al., 2021). The implementation of a dynamic and customer-centric methodology can accelerate the development of exclusive goods and services that effectively appeal to the intended target market. Organizational culture plays a critical role when affecting the way a business approaches product creation, and one cultural style that can greatly affect this process is hierarchy culture (Bogale & Debela, 2024). Meanwhile, the hierarchy culture stands out for its primary focus on control, equilibrium, and the use of defined procedures.

Hierarchy cultures emphasize control, stability, and codified procedures, with decision-making power centralized at the highest levels (Boadu et al., 2023). This culture can stifle innovation through restricting employees' capacity to test new ideas and approaches. However, it can also aid in efficient resource management along with workflow enhancement, resulting in quality and operational improvements. Companies can develop a positive association between hierarchical culture as well as product innovation by forming independent innovation teams or departments that follow quality control rules. This approach can lead to the progress of yields with exceptional quality as well as thorough deliberation.

H3a There is a positive relationship between clan culture and product innovation

H3b There is a positive relationship between adhocracy culture and product innovation

H3c A good association is present between market culture as well as product innovation

H3d There is a good connection between hierarchy culture as well as product innovation.

2.5 Moderating Role of Management Support

In an organizational setting, managerial support plays a substantial and advantageous moderating part in the relationship between knowledge management and product innovation. The methodical creation, sharing, as well as use of data within an organization is known as knowledge management, and it promotes a culture of ongoing learning and adaptation (Zamiri & Esmaeili, 2024). On the other hand, product innovation signifies the advance and introduction of fresh or improved products to the market, reflecting an organization's ability to stay competitive and meet evolving consumer demands.

Support from management plays a crucial role in this dynamic interaction, influencing how well knowledge management programs propel product innovation (Sobaih et al., 2025). The adoption of methods for information management is facilitated by competent management and leadership, which fosters an atmosphere where staff members are inspired to exchange, produce, and use knowledge (Bhatti et al., 2013; Farrell, 2017). This support can manifest through resource allocation, providing training opportunities, and cultivating a culture that values collaboration and knowledge allotment.

The positive moderating role of administration support becomes evident in its ability to bridge potential gaps between knowledge management processes and tangible product innovation outcomes (Urgal et al., 2013). By actively endorsing and participating in knowledge management initiatives, leaders can align organizational goals with the innovation agenda. Management support serves as a catalyst, ensuring that the knowledge generated within the organization is effectively translated into innovative products that meet market needs (Dul & Ceylan, 2014).

Furthermore, management support helps overcome resistance to change and fosters a climate of openness, where staff's impression allows them to experiment with innovative thoughts and approaches (Hsu et al., 2019). When combined with supportive leadership, this encouragement increases the organization's ability to translate information into unique product hooks. Thus, the regulating consequence of management backing strengthens the positive suggestion between knowledge management as well as product innovation, resulting in a synergistic effect that drives the company towards long-term competitiveness in the market. Hence, we posit that.

H4 The association between product innovation and knowledge management is positively moderated by management support.

The proposed relationships are given in Figure 1.

THEORETICAL FRAMEWORK

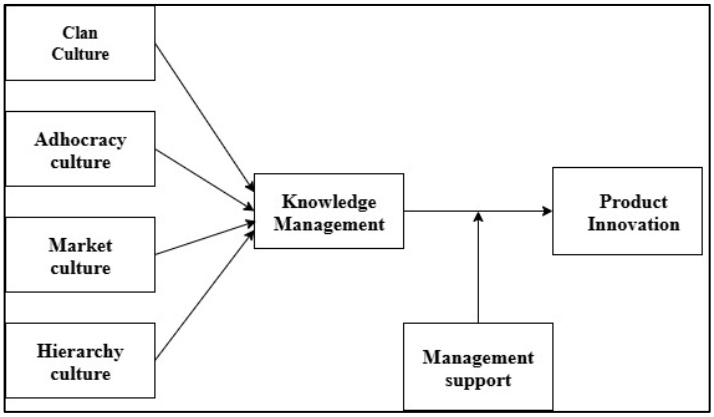

Figure 1: *Theoretical Framework*

METHODOLOGY

The population for this learning includes Small and Medium Enterprises in Pakistan, i.e., 3.2 million SMEs. Since the study's focus is on the bond between organizational culture and product innovation, the researcher focuses on business SMEs from Central Punjab, which includes Lahore, Sialkot, Gujranwala, and Gujrat. Nevertheless, the population of interest includes all SMEs of the manufacturing type. The key reason for selecting these cities is that these regions include a high number of active and registered SMEs.

The owners of SME businesses provided the study's data. Product development, research and development, and service provision were among these divisions. Regarding the study's dependent variables, owners of SMEs are expected to be highly educated and trained in quality standards. These professionals may be as knowledge workers since they apply their knowledge and expertise, which are essential to the businesses' existence and performance (Sekaran, 2009).

Measurement

Aligned with the purposes of the study, the survey aimed to gather

facts pertaining to factors such as organizational culture, knowledge management, quality management, and product innovation. The survey questionnaire consisted of two components. The contributors' age, gender, and length of service with their present employer were among the pertinent information on demographics gathered in the first segment. The relevant factors were covered in the questionnaire's next section. In order to collect data for this study, participants' answers were obtained using a Likert scale with five ranks. On this metric, a score of 1 indicated substantial differences while a score of 5 indicated strong agreement. According to Likert, the goal of this data collection was to evaluate the efficacy of the conceptual model created for the current study. The following is a comprehensive overview of diverse metrics.

The measurement of constructs is as follows: organizational culture dimensions have four items, i.e., four items for adhocracy culture, clan culture, market culture, and hierarchical culture. The items were adapted from studies by Charlene et al. (2012), Deshpande et al. (1993) and Shuaib and He (2021). Knowledge Management has seven items, and these items were adapted from the study of Alegrre et al. (2013). The construct of product innovation was measured using five items modified from previous studies (Herrmann et al., 2007; Kim et al., 2012; Valle & Vázquez-Bustelo, 2009). Finally, the hypothesis of administration backing was changed from Prieto-Pastor and Martin-Perez (2015). All items have been measured on five-point Likert scales.

Pre-Testing of the Questionnaire

A pilot test is advised before the official survey is conducted to guarantee clarity and reduce potential inaccuracies. As the construct validity with the dependability of the population are improved, the findings of the pilot study become more generalizable (Bryman & Bell, 2015). Finding potential flaws in the techniques used for surveys and questionnaires is the aim of this study (Kothari, 2004). According to Veal (2006) a pilot test is a preliminary trial conducted on a smaller scale to assess the functionality of the research instrument before using it in a larger survey. Insights regarding the language utilized, item sequencing and arrangement, respondent relevance, fieldwork methods, and investigative methodologies are also provided by the pilot test. It also gives a rough estimate of how long it should take to complete and how quickly responses should be expected (Veal, 2006).

Two prominent academics with a specialized understanding in information technology are given the study questionnaire as part of the pre-testing section of this research. Two telecom industry experts who worked for the same company were given access to the questionnaire. Pre-testing was directed to evaluate the respondents' understanding of the inquiries and identify any potential errors. The questionnaire underwent modifications in response to positive feedback regarding its content and comprehensibility from academic faculty, business practitioners, and 60 Master's and Doctoral students specializing in TQM from several universities situated in Lahore. The pilot testing phase involved selecting a sample size of 60 people, as recommended by Monette et al. (2013). The individuals mentioned above exhibited similar characteristics to those found in the final sample. The findings show that the factors' replies were trustworthy, as demonstrated by a Cronbach's Alpha factor of more than 0.7. The final survey was officially initiated when these stakeholders verified the questionnaire's validity.

Data Collection

The research employed a survey methodology, gathering information through a self-administered questionnaire. The data was collected between 1st Oct and 31st Dec, 2024. During the first phase, paper-based surveys were given to employees of small and medium-sized businesses (SMEs) across Central Punjab, including Lahore, Sialkot, Gujranwala, and Gujrat, in person. The author conducted on-site visits to small and medium-sized enterprises (SMEs) positioned near him, and he acquired information on the remaining companies through colleagues, friends, and referrals. Self-administered questionnaires, according to Akbayrak (2000), ensure high response rates and are useful for researchers in terms of saving time, coinage, and energy.

Before the official data collection process started, a preliminary pilot test took place. During the visits, potential respondents were discreetly asked if they would have been interested in taking part in the study. Plaintiffs were reminded that their data would be kept private and that there was no danger of data disclosure. The respondents gave their consent to participate, and the researcher did not put any pressure on them. To ensure impartial analysis, paper-based written questionnaires were provided, and respondents promptly returned them. Each answer was obtained at the respondents' leisure, and the questionnaire took roughly 10 minutes to complete. The time of data gathering commenced directly after the defense of the summary and ran for six months. To prevent challenges with missing data or inaccurate response rates, the researcher made an effort to ensure that every questionnaire was properly filled out. The study's participants were not compensated in any way. According to the required sample size, 600 were physically distributed among the respondents.

Common Method Bias (CMB)

In this study, we took a variety of methods to avoid typical technique bias in CMB. Most importantly, we made sure the survey questions were clear, uncomplicated, and simple to comprehend. This eliminated the chance of any misinterpretation or ambiguity that might lead to skewed opinions. Additionally, we examined various facets of the variables by distributing the questionnaire's questions using certain distribution strategies. This method lessened the likelihood that participants would respond to the questions in a repetitive manner or by depending on broader patterns. To properly assess and reduce the likely effects of CMB, we used ex-post statistical methods. The Harman's single influence test, as endorsed by Podsakoff et al. (2003), was one of the tactics we used. All of the sample's components were put onto a single variable, which explained only 21% of the total variation, according to the test's results. This finding indicates that CMB is not extremely dangerous in our research because it is far lower than the suggested threshold of 50%.

To investigate the connection between the marker variable and the recommended routes, we also conducted a partial correlation analysis. The analysis's findings demonstrated that the addition of the indication adjustment had no discernible impact on the

expected correlations or related statistical validity. This finding adds to the evidence against CMB in our study. Finally, we looked at the correlation coefficients to see if there was multicollinearity between the variables. The correlation coefficients were all less than 0.7, which shows that multicollinearity is not a major concern (Johnson & LeBreton, 2004). Our research effectively addressed and minimized the probable implications of common procedure bias by putting these measures in place and analyzing the outcomes, which we feel ensured the validity and reliability of our findings.

DATA ANALYSIS

Table 1 presents the analysis of the item being tested profile in preliminary information. It demonstrates that 59% of the participants were between the ages of thirty and thirty-nine when the majority of the data was gathered. The eighteen to twenty-nine youth group (26%) and the forty to forty-nine age group (12.3%) came next. Male participants responded greater than female participants in terms of gender profile. According to the education demographic, the majority of study contributors hold bachelor's degrees (54%) as opposed to college degrees (32%) and master's degrees (14.2%). Regarding management levels, upper-level management accounted for 10% of the data, while lower and middle-level managers accounted for 90%.

Table 1: Respondents' Demographics

Demographics	Levels	Number	Percentage
Age	18-29	93	26.0
	30-39	214	59.8
	40-49	44	12.3
	50+	7	2.01
Gender	Male	230	64.2
	Female	128	35.8
Education	College level	113	31.6
	Bachelors	194	54.2
	Masters or above	51	14.2
Management Level	Lower level	134	37.4
	Middle managers	190	53.1
	Top level management	34	9.50

Measurement Model

Structural equation modeling (SEM) was utilized to assess hypotheses, analyze mediation, and study validity. Therefore, a covariance-based capacity system that assesses the component arrangement, as well as modifications mentioned among the core variables, was developed with the benefit of AMOS software. Environmental how they perform, environmental ethics, environmental constraints, environmentally conscious product innovation, and sustainability performance, served as the foundation for the covariance model's construction. The model capability indicates that there are no issues with model fitness, as $\chi 2/df < 3$ (1.296), CFI > 0.90 (0.988), TLI > 0.90 (0.987), and RMSEA < 0.08 (0.029) (Hair et al., 2006).

Since each variable's factor loading values are larger than 0.5, each variable's incorporated dependability is more than 0.7, as well as the ordinary inconsistency recovered, falls within the range, AVE > 0.5, the convergent validity is validated (Hair et al., 2006). Table 2 offers a summary of the recurrent reliability information.

Table 2: Recurrent Reliability of Constructs.

Constructs	Items	Loadings	Composite Reliability	AVE
AC	AC1	0.808	0.898	0.689
	AC2	0.845		
	AC3	0.858		
	AC4	0.807		
CL	CC1	0.689	0.826	0.545
	CC2	0.650		
	CC3	0.820		
	CC4	0.781		
HC	HC1	0.816	0.882	0.652
	HC2	0.839		
	HC3	0.733		
	HC4	0.838		
MC	MC1	0.794	0.885	0.659
	MC2	0.805		
	MC3	0.860		
	MC4	0.785		
KM	KM1	0.926	0.971	0.870
	KM2	0.913		
	KM3	0.938		
	KM4	0.907		
	KM5	0.979		
PI	PI1	0.842	0.921	0.699
	PI2	0.868		
	PI3	0.830		
	PI4	0.831		
	PI5	0.807		

Note: AC= Adhocracy Culture, CL= Clan Culture, HC= Hierarchical Culture, MC= Market Culture, KM= Knowledgement Management, PI= Product Innovation.

The method to evaluate the discriminant rationality was approved as of (Hashmi et al., 2020). The square root of the average variance extracted (AVE) from each model component must be larger than the parallel correlations, as described in scholarly literature. This measure is validated in Table 3, guaranteeing the differential reliability of the constructs.

Table 3: Discriminant Validity of Constructs.

	1	2	3	4	5	6
HC	**0.808**					
AC	0.596	**0.830**				
MC	0.675	0.591	**0.812**			
CC	0.226	0.219	0.139	**0.738**		
PI	0.446	0.447	0.477	0.256	**0.836**	
KM	0.596	0.502	0.548	0.245	0.436	**0.933**

Hypothesis Testing

A structural model had been built to examine the suggested links after the validity evaluation. Results about hypothesis testing are shown in Table 4. With a p-value < 0.05, it demonstrates the correlation's β-value (0.105) from clan culture toward knowledge administration is substantial and affirmative. H1a is therefore supported. The β-value (0.159) from adhocracy culture to knowledge management is affirmative as well as noteworthy, with a p-value < 0.05. Hence, H1b is supported. The β-value (0.234) from market culture to knowledge management is affirmative as well as noteworthy, with a p-value < 0.05. Hence, H1c is supported. The β-value (0.387) from hierarchy culture to knowledge management is affirmative as well as noteworthy, with a p-value < 0.05. Hence, H1d is supported. Besides, the β-values (0.153) from knowledge management to product innovation are affirmative as well as noteworthy, with a p-value < 0.05. Hence, H2a is supported. In the case of organizational culture and product innovation, the β-values (0.134) from clan culture to knowledge management are affirmative as well as noteworthy, with a p-value < 0.05. Hence, H3a is supported. The β-values (0.174) from adhocracy culture to knowledge management are affirmative as well as noteworthy, with p-value < 0.05. Hence, H3b is supported. The β-values (0.246) from market culture to knowledge management are affirmative as well as noteworthy, with a p-value

< 0.05. Hence, H3c is supported. Finally, the β-values (0.087) from hierarchy culture to knowledge management are not significant as well as noteworthy, with p-value > 0.05. Hereafter, H3d is not maintained.

Table 4: Hypothesis Testing.

Hypothesized Paths			Estimate	S.E.	C.R.	P	Results
KM	←	AC	.159	.066	2.399	.016	par_20
KM	←	CC	.105	.047	2.220	.026	par_21
KM	←	MC	.234	.075	3.126	.002	par_22
KM	←	HC	.387	.084	4.627	***	par_26
PI	←	HC	.087	.097	.901	.368	par_30
PI	←	AC	.174	.076	2.307	.021	par_31
PI	←	CC	.134	.054	2.466	.014	par_32
PI	←	MC	.246	.086	2.852	.004	par_33
PI	←	KM	.153	.065	2.359	.018	par_34

Mediation as well as Moderation Inquiry

With the aid of AMOS, the bootstrapping technique was used to validate the mediation results. The results of the bootstrapping are shown in Table 5. Results show that adhocracy culture has a momentous undeviating outcome (β=0.174, p < 0.05) and a momentous subsidiary outcome via knowledge management (β=0.024, p < 0.05) on product innovation. Also, clan culture has a momentous undeviating outcome (β=0.134, p < 0.05) and a momentous subsidiary outcome via knowledge management (β=0.016, p < 0.05) on product innovation. Likewise, market culture has a momentous undeviating outcome (β=0.246, p < 0.05) and a momentous subsidiary outcome via knowledge management (β=0.036, p < 0.05) on product innovation. However, hierarchy culture has a momentous undeviating outcome (β=0.087, p > 0.05) and a momentous subsidiary outcome via knowledge management (β=0.059, p < 0.05) on product innovation. Overall, information supervision mediates the relation between organizational culture and product innovation, supporting H2b.

Table 5: Bootstrapping Results.

Mediation Paths	Indirect Effects	Bootstrapping p-value	Direct Effect	Bootstrapping p-value	Result
AC→KM→PI	0.024	0.031	0.174	0.038	Partial
CC→KM→PI	0.016	0.034	0.134	0.005	Partial
MC→KM→PI	0.036	0.008	0.246	0.018	Partial
HC→KM→PI	0.059	0.002	0.087	0.445	Full

With AMOS's assistance, a framework was created to investigate the moderating function of management support. The correlation between knowledge oversight as well as the development of products is strongly moderated by management support, as indicated by Table 6, which also demonstrates that this connection term has a substantial and positive connection to product creation.

Table 6: Moderating Role of Management Support.

			Estimate	S.E.	C.R.	P	Result
ZPRO_IN	←	ZKM	.410	.049	8.422	***	Supported
ZPRO_IN	←	Interaction	.094	.044	2.127	.033	Supported
ZPRO_IN	←	ZMNS	.134	.048	2.764	.006	Supported

DISCUSSION OF RESULTS

To The present investigation discovered that knowledge about leadership in small and medium-sized businesses (SMEs) is strongly and favorably correlated with clan culture. This association is in line with earlier studies on how workplace culture affects processes connected to knowledge. The study also emphasized how intricately clan knowledge and cultural maintenance are related, encompassing elements like knowledge creation, sharing, and application.

Likewise, the study discovered a positive correlation between knowledge management among SMEs and adhocracy culture. Adhocracy culture, which is characterized by flexibility, risk-taking, and creativity, improves the creation, sharing, and application of knowledge outside of institutions. This culture encourages cooperative knowledge exchange and fosters an open and responsive mindset. The study also discovered a noteworthy correlation between hierarchy culture and knowledge management in SMEs. Stability, control, and formalization are characteristics of hierarchical cultures that facilitate the systematic production, preservation, and distribution of information. This environment gives businesses a structure that encourages official knowledge management procedures.

However, the study found no significant and affirmative correlation between market culture as well as knowledge management in SMEs. Despite traits like competitiveness as well as customer orientation, market culture fails to boost knowledge management outcomes in SMEs. This demonstrates that companies must carefully evaluate the cultural elements that support effective knowledge management because a one-size-fits-all solution could not work in many organizational contexts.

The study looks at the relationship between small and medium-sized firms (SMEs) with knowledge management (KM) and product innovation. It aims to expand on past research that primarily concentrated on larger companies. The findings demonstrate the generalizability of such a relationship across the particular context of SMEs and support the positive impact of KM techniques on product creation. The study also emphasizes the significance of information generation, dissemination, storage, and execution, as well as basic knowledge management strategies that have an undeviating impact on product innovation within SMEs (Shujahat et al., 2019; Yi et al., 2021). The results are consistent with the findings, demonstrating a clear and positive impact of KM methods on product innovation within SMEs. The examination fills the existing research void of SMEs, as it is crucial to recognize the influence of KM practices on product innovation within these organizations (Inkinen et al., 2015).

Study Contributions

This research, which concentrates on Pakistan's medium-sized companies (SMEs), provides a substantial addition to the research of organizational culture as well as outstanding management. It investigates the connections between these components, focusing on the ways in which corporate culture influences product innovation and excellence assurance. The learning employs a thorough approach to understand how different ways an organization's culture may facilitate or hinder product innovation while maintaining stringent quality standards.

This paper is a groundbreaking attempt to advance our understanding of how culture influences the outcomes of quality management and product innovation. The study also highlights the prominence of knowledge management as a mediator in the affiliation between organizational culture, quality management, and product innovation, as this aspect has been neglected in prior research. Diverse organizational cultures, such as market, hierarchical, clan, as well as advertising cultures, are combined

into the study's theoretical framework to produce an enhanced grasp of the cultural types that are most suited for developing high-quality goods and fostering creative solutions. By applying the contextually appropriate theoretical construct provided by this taxonomy and research of cultural typologies, organizations can more effectively align an ethnic orientation that their primary goals of fostering innovation and enhancing quality.

The study fills a significant breach in the body of academic literature by examining how organizational culture impacts SMEs in developing countries, particularly concerning resource constraints and distinctive cultural traits. It also contributes to the Knowledge-Based View paradigm by examining how cultural traits either support or hinder the development and use of understanding assets for quality administration and product innovation.

To sum up, this research gives important information regarding the intricate links found among quality management, product innovation, as well as culture of organizations in Pakistani SMEs. This report offers valuable insights for Pakistani SMEs, particularly those with limited resources, regarding the impact of company culture on product quality and innovation capabilities. It suggests that strategic alignment from company culture, quality management systems, and modernization creativity may lead to more effective and resource-efficient methods. By coordinating hiring practices according to the desired corporate culture and implementing customized training and development programs, SMEs can cultivate a workforce that takes an active part in quality management and product innovation. The study also has an impact on human resource management, highlighting the significant influence corporate culture has on employee values and behavior. The report also suggests developing useful methods for assessing organizational culture in the sector, which will enable businesses to achieve superior performance and creativity.

The study also provides helpful recommendations for SMEs on the lookout to progress their knowledge management plans. It encourages the adoption of knowledge-sharing platforms, teamwork tools, and efficient information management systems to foster an environment that supports innovation and quality improvement. The research also makes recommendations to policymakers and industry support groups working in the sector, with a focus on training programs, mentorship initiatives, and knowledge-sharing systems personalized to the exceptional needs and constraints of SMEs in Pakistan.

Limitations and Future Directions

Clan, adhocracy, market, as much as hierarchy were some of the unique organizational cultures for Pakistani SMEs which are the subject of this inquiry. This strategy has shortcomings in terms of generalizability, though, due to the unique contests tackled by SMEs in Pakistan. The findings' adaptability could possibly be determined by the multifaceted nature of firm culture, particularly can differ among different regions or industries. The cross-sectional study approach offers a static snapshot of the relationships between legislative values, quality management, and product innovation at a certain point in time. However, its temporal breadth is insufficient to fully understand the dynamic character of corporate culture and its enduring impacts. Longitudinal studies can offer a more comprehensive understanding of how organizational culture influences the long-term results of quality management and product innovation in a dynamic organizational setting.

Future research should consider conducting a comparative analysis to decide the degree of resemblance between the outcomes of SMEs' quality management along innovation performance across industries. This will reinforce the practical implications for different industry landscapes and reveal any subtleties that may be specific to the sector. In order to further develop the theoretical framework and provide a more thorough sympathetic of the ways legislative values impact various SMEs, future research should also look at other aspects of quality management and innovation, such as administrative innovations, different kinds of improvements to processes, managerial leadership, and quality training initiatives. Finally, qualitative research techniques, such as in-depth interviews and focus groups, can offer important insights into the intricate connections between the external and internal hidden components.

Conflict of Interest Statement:

The authors declare no conflict of interest.

Informed Consent statement:

Written informed consent was obtained from all participants before data collection. Consent was gathered by the researcher during in-person visits to SMEs in Central Punjab, Pakistan, between 10/2024 to 12/2024. Participants were informed about the study's purpose, assured of anonymity and confidentiality, and informed that participation was voluntary and that their data would be used solely for academic research and publication.

Data availability statement:

The data that support the findings of this study are available from the corresponding author upon reasonable request. Due to privacy and confidentiality agreements with the participants, the raw survey data are not publicly shared. However, de-identified datasets and summary statistics can be provided to qualified researchers for academic purposes upon request. All data used in the analysis were collected through a structured questionnaire distributed among SME professionals in Central Punjab, Pakistan.

Ethical Approval Statement:

This study involved survey-based research conducted with professionals working in small and medium-sized enterprises (SMEs) in Central Punjab, Pakistan. All participants were informed about the purpose of the research, assured of the confidentiality and anonymity of their responses, and provided informed consent before participation. The research protocol was reviewed by the departmental ethics committee at the Institute of Quality and Technology Management, University of the Punjab. The study was conducted under the ethical principles outlined in the Declaration of Helsinki and the Belmont Report. Ethical approval was obtained from the University of the Punjab's ethical review board.

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Authors' Contribution:

1. Arslan Aslam: Conceptualization, Methodology, Data Collection, Writing – Original Draft
2. Muhammad Usman Awan: Supervision, Writing – Review & Editing
3. Ahmad Sohail Lodhi: Writing – Review & Editing, Resources

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