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# The Influence of Management Innovation and Technological Innovation on Organization Performance. A Mediating Role of Sustainability

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**Abstract:** Organizations have several objectives, including competitiveness, high profit and long-term survival. However, sustainability has become a diligent act of business and non-business organizations because it moves organizations toward superior performance. Sustainability does not come itself; it requires enough resources and capabilities. Extant studies have examined the factors that influence sustainability, but have rarely touched on innovation in this perspective. The present study examines the influence of management innovation and technological innovation on organization performance with the mediating role of sustainability. To test the model, we applied structural equation modeling in the analysis of a moment structures (AMOS) on the empirical evidence collected from 304 Pakistani CEOs and top managers. The results indicate that management innovation and technological innovation significantly positively contribute to sustainability and organization performance. Sustainability plays a partial mediating role between management innovation and organization performance and also a partial mediating role between technological innovation and organization performance. We recommend CEOs and top managers to give due attention to management innovation and technological innovation to enhance sustainability and survive the long run. Implications are discussed.

**Keywords:** management innovation; technological innovation; sustainability; organization performance

## 1. Introduction

Several management theories (e.g., neoclassical theory) assume that the key objective of an organization is to earn a profit. For this purpose, organizations use different methods and tactics to gain high performance [1]. However, recent studies have claimed that environmental and economic performance (hereby referred to as sustainability practices) are necessary for getting superior profitability [2,3]. In other words, a firm can gain high profit by performing and encouraging sustainability practices [4]. In its broadest conceptualization, sustainability is defined as meeting the needs of the present without compromising the ability of future generations to meet their own needs [5]. In management research, it is described from the corporate social responsibility (CSR) perspective and generally indicated through a range of social, political, cultural, legal, economic and natural environmental dimensions [6]. Research in sustainability is concerned with potential impact on corporate social performance [7]. Considering its potential contribution to financial performance, achievement of sustainability has become the priority of business [8] and non-business organizations [9]. Nevertheless, not all organizations are able to perform sustainability practices [10,11]. Some organizations have enough resources and capabilities which enable them to achieve sustainability

practices (e.g., [9]). A plethora of research has discussed the factors that influence sustainability practices such as strategic orientation [12], organizational change [13] and organization commitment [14] etc. At this point, the existing studies have mainly focused on traditional factors while innovative predictors are rarely touched. To put it another way, the influence of Management Innovation (MI) and Technological Innovation (TI) on sustainability. MI and TI are considered crucial for sustainability.

Despite having a broader debate, mixed findings; positive, negative, significant and insignificant have been reported between sustainability and performance [6,15]. The present study, on the one hand, is an attempt to explore the relationship between sustainability and firm performance. However, due to globalization, firms have turned to technological practices and have focused on innovative activities [16]. Recent studies claim that innovation is the best choice for organizations to survive a long run in turbulent markets [17]. A variety of innovation types have been discussed such as eco-innovation, social innovation, product innovation, marketing innovation and organization innovation [18] that can impact a firm's performance. Out of all the innovations, the MI (e.g., [18]) and TI ([19]) have been considered the most prominent factors for the survival of organizations. Despite the significant importance of innovation, MI and TI are still rarely touched in terms of firm sustainability. Notwithstanding, existing studies have also examined the direct influence of MI and TI on organizations performance [20,21]. However, in fact, the question "Do MI and TI contribute to the organization's sustainability?" is still unanswered. In other words, this research is an attempt to check if either MI or TI directly influence organization performance or if sustainability mediates the relationship.

The present environmental problems call for more environmentally benign technology. For instance, Kemp (p. 2) [22] described that "the past two decades witnessed a heightened concern over environmental degradation of the various options open to society to reduce the environmental burden, technology is widely considered as the most attractive". The theme (that technology is the best option in environmental performance and sustainability) is favored by many recent studies [21,23,24]. However, due to the diverse environmental problems since the 1990s, tensions were inevitably triggered within the firms, encouraging them to formulate internal processes; innovation, technology and non-technology drivers. Especially adequate governance, planning and organizational processes should be integrated within the organization to move in line with environment changes [2]. We suppose that neither MI nor TI on its own can spur sustainability and performance, but both types of innovation are complementary. As pointed out by Vaccaro et al. [25], competition has pushed firms towards technological changes and firms need to renew their internal structures. However, the changes are not concerned with offering new products and services, but also altering the nature of management within organizations.

Sustainability is a multidimensional phenomenon. It is often merged with environmental performance and economic performance. It is often described as a measure of a firm's capability to accomplish its mission and serve its stockholders over a longer period and to have an acknowledged and quantifiable influence. Sustainability when successfully achieved can lead to more extensive sources of funding and configure a firm capacity to provide value in the long run [26]. In short, a firm that relies on sustainability leads to a greater emphasis on long-term survival. Firms with successfully achieved sustainability can achieve their long-term goal [27] and can better perform in a resource-constrained environment [26,28]. Sustainability is about expanding the financial bottom line into a triple bottom line, which includes environmental and social aspects of corporate performance [29]. Hence, sustainability should not be restricted to only environment practices to gain environmental objectives but it can also facilitate other advantages (e.g., gaining long-term survival and profitability) in a turbulent market when successfully achieved [3]. In this study, sustainability is considered an essential practice of a firm that provides environmental, social and economic benefits to configure the firms' sustainable competitive position. For instance, Nidumolu et al. [30] described that sustainable development is the only way available for enterprises' growth, decreasing production costs and generating additional revenues from novel offerings or business expansion. Their empirical study

found that (p. 2) “sustainability is a mother lode of organizational and technological innovations that yield both bottom-line and top-line returns.” However, organization performance demonstrates firm objectives to gain high profits, high sales growth and top market share [31].

The phenomenon of innovation has attracted many management scholars. Beyond the universal product and technological innovation, a variety of innovations have been introduced such as service innovation (e.g., [32]), business model innovation (e.g., [33]) and process innovation (e.g., [34]). But MI and TI are well-known factors in strategic management literature that can configure organizations performance. For instance, Ref. [35] claims that MI represents one of the most prominent sources of competitive advantage and sustainable performance in the business world. Similarly, it is argued that TI is a necessary tool for a sustainable position in the current era of globalization [36]. Surprisingly, recent studies still claim a lack of research in term of MI and TI [20,21,37]. Considering the supposition that MI and TI do not always directly contribute to firm performance, we intend that both types of innovation help organizations in acquiring sustainability which in turn provides high profitability.

This research contributes to the existing literature of MI, TI, sustainability and organization performance in several ways. The model of this research is based on empirical evidence collected from an emerging market, Pakistan, which may provide valuable implications because of its location. We test the extent of sustainability that influences the relationship between MI and TI that has ignored in prior studies. In terms of theoretical underpinning, this research tries to clarify the ambiguity about the relationship between sustainability and financial performance. For instance, Yu and Zhao [38] suggested two competing theories; value creating and value-destroying to examine the influence of sustainability on financial performance. Value creating theory demonstrates that risk is reduced with the adoption of social and environmental responsibility. On the other hand, the destruction theory indicates that firms engaged in social and environmental responsibility lose focus on profitability but please shareholders [39]. In addition, this research tests the Resource Base View (RBV) theory that demonstrates a prominent role of unique resources (tangible and intangible) in a sustainable competitive position [40]. Similarly, upper echelon theory also claims that top management activities are the significant factors that influence organizational outcomes and performance [41]. We as a result of this, we deem MI a new practice that can contribute to corporate sustainability and performance. Alternatively, this research recognizes the most critical factors that can help emerging organizations that face significant challenges; lack of resources, lack of support and lack of capabilities.

## 2. Theoretical Background and Literature Review

### 2.1. Management Innovation and Organization Performance

There is no single definition for MI and TI [42]. According to Damanpour [43], MI has been conceptualized in contrast to technological innovation and pertains to new practices and process in management and administration. For some researchers, MI refers to the traditions and structures that are new to the state of the art, demonstrating that it has no universal model (e.g., Chandler’s (1962) [44]). However, other researchers see MI as something that is new to a firm and is adapted from another context, maybe from peer firms (e.g., [45]). MI is referred to as new management practices that are intended to enhance firm performance. Is it defined as “generation and implementation of management practice, process, structure or technique that is new to state of the art and is intended to further organizational goals” [46] (p. 829). Usually, it discusses changes in what managers do and how they do it [35]. Therefore, MI then associated with the changes such as how managers set their directions, how they make decisions, how they coordinate activities and how they motivate employees [35]. These changes are considered as a part of organizations that are manifested by new management practices, processes and structured and lied in MI. Notably, in competitive intensity and turbulent markets such as China, MI strengthen a firm’s internal processes that significantly improve the financial performance of firms [47]. Though Schumpeter has introduced several types of innovation; product, market, process and organization etc. Not all the innovations are equally

useful; some innovations (characterized by top management practices) are more beneficial for a firm's profitability because of R & D activities and innovative tactics [18]. In addition, it is also suggested that MI enables business firms to adopt various innovative and technological processes that are required for smooth running to operational activities [48]. MI has been deemed a key tool for organization growth and profitability. In the Structural Equation Modeling (SEM) sector, it helps to respond effectively to the external challenges. MI can spur firm performance in a significant way in dynamic environments [49]. MI helps organizations in a variety of ways, but it plays a significant role in the improvement of firm productivity and performance [50]. Hinterhuber and Liozu [51] claimed that an innovative management system uses different policies and procedures to utilize resources in an effective way that help organizations to gain a sustainable competitive positions. Top management of organizations favors the crucial role of MI in organizational success. Hence, they give enough attention to configure MI in the various departments [50]. Though management practices help organizations several ways, the innovation role of the top management team cannot be understated in terms of product and process improvement, which in turn significantly improve profitability [52]. MI helps the organization to achieve high performance by integrating multiple practices within the organization in novel ways. More preciously, MI is a significant driver of organization performance [21,53]. It is argued that MI significantly and positively contributes to firm financial performance [20]. Therefore;

**Hypothesis (H)1.** *Management innovation improves organization performance.*

## 2.2. Technological Innovation and Organization Performance

According to Damanpour and Evan [54] (p. 394), technological innovation refers to “the implementation of an idea for a new product or a new service or the introduction of new elements in an organization's production process or service operation.” However, Singh, Mathiassen and Mishra [55] stated in their study that material technologies are applied for technological issues in organizations. For instance, to develop an application, a firm can create generic tasks and resources to proceed with the application. Additionally, they stated that the technological trajectory that is considered a possible direction of technology tool that helps to build a technological paradigm. We favor the phenomenon that MI leads to sustainability and in turn, creates superior performance. In the modern business world, TI has become a central focus of top management in various organizations. It is argued that in the turbulent markets, those firms succeed that have modern technology used for products and services [56]. In strategic management literature, particularly from an RBV perspective, a firm with unique resources and capabilities can achieve a sustainable competitive position in a turbulent market and outperform its closed competitors and industry rivals [40,57]. TI helps firms to produce a variety of new products and services that in turn are important for high performance and profits [58]. In a turbulent market, those firms become leaders of the market and gain high profitability, which has high informational technological capabilities [59]. Particularly, in emerging markets, a firm's goal of high profit can be gain through TI [60]. In an uncertain environment, TI enables firms to become leaders of a particular industry and seize market profit easily. On the other hand, having no or less TI can attenuate firms to effectively increase their sales growth [61]. TI is not only feasible in a particular industry [62] but various sectors such as manufacturing and services increase their performance by adopting TI [63]. Compared to non-technological innovation, TI has a more significant influence on firm performance and success [24]. TI is considered an important driver that significantly contributes to firm performance [21]. Therefore;

**Hypothesis (H)2.** *Technological innovation improves organization performance.*

### 2.3. Management Innovation and Organization Sustainability

Top managers are responsible for strategic decision making and long-term goals. To perform sustainability practices in the current era of globalization, firms use different approaches. However, out of many approaches, MI has deemed a significant factor especially in emerging markets [64]. Due to the increasing importance of sustainability for business firms, managers have now focused the strategies (such as innovation, organization knowledge and learning) that can configure sustainability practices [65]. Sustainability is not crucial only for the betterment of the environment but also plays a significant role in organizational performance. Hence, senior managers opt for various innovative activities and environmental strategies to enhance their suitability [66]. A firm has several objectives but gaining competitive advantage and sustainability are preferable objectives that can be gained through MI [67]. For instance, a firm in the current era intends to gain high social performance, high environmental performance and high economic performance. All these outcomes are themes of sustainability for which a firm needs the significant support of MI [42]. Top management needs ongoing innovation diffusions to connect internal strategies and processes with external environmental changes and pressures [66]. MI is now a central factor for enhancement of organizational sustainability [68]. Therefore;

**Hypothesis (H)3.** *Management innovation improves sustainability.*

### 2.4. Technological Innovation and Organization Sustainability

In an uncertain environment, firms need to respond to the environment effectively and efficiently. However, a good response is not easy until firms have adopted TI [69]. Technological assets configure a firm's internal process, absorptive capacity and practices that in turn make a firm able to achieve its goals (economic and social) more easily [70]. Anwar [57] argues that business model innovation encompasses technological and non-technological innovation. Considering its technological attributes, Carayannis et al. [71] scrutinized that business model innovation is considered as lever for organizational sustainability. In a similar context, Chesbrough [72] claimed the technological advancement have forced business organizations to change, thus business models must be integrated in a way to take into account the dynamics of industry and environments. According to Nidumolu et al. [30] (p. 2), "sustainability is a mother lode of organizational and technological innovations that yield both bottom-line and top-line returns". TI does not only help the business industry to enhance their profitability but also encourage them to facilitate and improve economic growth, contribute to environmental and employment factors [73]. Technological advancements and innovative practices are needed to respond the environmental pressures and gain sustainability [74]. To summarize, TI is a significant factor for organization sustainability [23]. Therefore;

**Hypothesis (H)4.** *Technological innovation improves organization sustainability.*

### 2.5. Sustainability and Organization Performance

A sudden change in the current business era calls for sustainable business models. Therefore, the concept of sustainability has become essential to help firms achieve their performance targets. High sustainability helps firms to improve different processes which make them outperform competitors in the long run [4]. Moreover, Alonso-Almeida et al., [75] suggested that sustainability practices spur a firm's performance in a difficult time. Hence, managers are strongly recommended to enhance sustainability as it can significantly contribute to firm performance [76]. Two competing theories try to explore the influence of sustainability on firm financial performance; one is the value creating theory and the other is the value destroying theory [38]. Value creating theory demonstrates that a firm's risk is reduced with the adoption of social and environmental responsibility. On the other



hand, the destruction theory indicates that firms engaged in social and environmental responsibility lose focus on profitability but please shareholders [39]. However, sustainability is not merely an environmental practice, but it also stimulates deep processes inside organizations that significantly improve financial performance [3]. Therefore, the internal measures of sustainability are often merged with the competitive advantage which significantly improves firm performance in emerging economies such as Pakistan [57]. Where a company faces fierce competition, sustainability in this situation helps to improve firm performance [77]. A recent review concludes that sustainability practices significantly improve financial performance of organizations [8,39]. Therefore;

**Hypothesis (H)5.** *Sustainability improves organization performance.*

### 2.6. Mediating Role of Sustainability

Some studies have confirmed the direct influence of MI (e.g., [18,20] and TI [21,24] on organization performance while other claims that the direct relationship is not always significant (e.g., [78]). For instance, Smith and Tushman [79] scrutinized that top management with innovative skills and capabilities (hereby referred to as management innovation) acquire valuable resources that are essential for organizational sustainability and competitive advantage. In their results, the sustainability and competitive advantage lead to superior performance [10,39]. Moreover, it is approached that MI is a global competition and a source of competitive advantage that is essential for business success [80]. MI that is considered as a non-technological innovation is also referred to as a managerial innovation that is new to organizations. It helps in strategic planning and decision-making processes (related to environment and markets) that have approached high performance [43]. In this thought, we argue that MI facilitates organizations to configure their sustainability that can become a significant way to gain high performance.

TI enables firms to build a sustainable position and achieve environmental success in a turbulent market which in turn configure profitability and high performance [56]. For instance, Ahuja and Katila [81] claimed that technological capabilities facilitate firms in the acquisition of valuable resources that can smooth the internal processes and structure of a firm which in turn significantly improves financial performance. Moreover, it is argued that TI plays a significant role as it can produce larger outputs from the same resources to spur and configure firm sustainability and growth which in turn, improves performance [82]. For instance, it is scrutinized that new and innovative technologies enable firms to acquire different types of resources that are crucial for high performance and environmental competitiveness [83]. In emerging economies, firms use various sources and resources to gain a competitive advantage and environmental success (which spur firm performance). However, TI is the perspective that is the most known factor that configures a firm to have a sustainable competitive advantage and success [72]. Having a strong background for the indirect relationship of TI, we suppose that TI first fashions sustainability and then results in high performance. Systematically, we also favor the indirect influence of MI on organization performance through sustainability. Therefore;

**Hypothesis (H)6.** *Sustainability mediates the relationship between MI and organization performance.*

**Hypothesis (H)7.** *Sustainability mediates the relationship between TI and organization performance.*

## 3. Methodology

### 3.1. Sample and Population

This research collected empirical data through a structured questionnaire from organizations operating in Pakistan. In Pakistan, it is hard to obtain data on investment in innovation projects, technology and management. Many Pakistani firms do not disclose all project investments in their reports which creates a problem in measurement. Hence, we relied on subjective measures instead

obtain adequate financial data. In addition, it is suggested that self-reported (subjective) measures give more valid information in emerging economies such as China, India and Pakistan etc. [57]. The top cities of Pakistan such as Islamabad, Lahore and Karachi were targeted because most organizations have their head offices in these areas. An English version questionnaire was used for data collection. For the purpose to gain better insights, we collected data from manufacturing, trading and services firms. A total of 700 organizations were randomly selected and 700 questionnaires were distributed among the organizations (only one questionnaire for each organization). We requested top managers (e.g., CEOs etc.) fill out the survey as they are more aware of their organizations' policies and planning [84]. We used a hard copy approach to collect data because an email survey does not give an adequate response rate. In the questionnaire, it was declared the data will be used only for research purpose and the organization information will not be disclosed publicly. We received 304 usable responses (e.g., 304 questionnaires), a response rate of 43.43%. In the mentioned cities, a sample size above 300 provides good results [57]. The profile of the firms who participated in the survey is given in Table 1.

**Table 1.** Profile of the firms.

Factors	Frequency	Percent
Age of firms		
10 years and less	86	28.3
11–20 years	107	35.2
21 and above years	111	36.5
Education of CEOs/Managers		
Intermediate and below	69	22.7
Bachelor	85	28.0
Master	127	41.8
PhD etc.	23	7.6
Nature of Industry		
Manufacturing	104	34.21
Services	100	32.89
Trading	100	32.89
Total	304	100.0

### 3.2. Measures

This research used two independent variables; MI and TI, one dependent variable named organization performance and sustainably as a mediating variable.

Management innovation is discussed as a multidimensional concept. However, we relied on the most used items in the current era and is probably covered in various dimensions. There were 6 items used by Vaccaro et al. [25] of which item 1 and item 2 were for management practices, item 3 and item 4 for management processes and item 5 and item 6 for structure.

Technological Innovation also does not have a single definition or measures. To cover the multiple dimensions, we relied on 9 items used by Lee et al. [85] where a sample item is “We use the latest technology for new product development”.

Sustainability is often merged in an environmental context. However, in this research, sustainability is amalgamated with broader dimensions including sustainable competitive position or an unbeatable status of an organization in the competitive markets. Sometimes it is also referred to as “sustainability performance”. To measure sustainability, we adopted 5 items from the prior study of Gelhard and Von Delft [86] where a sample item shows “Our competitors consider us as a leading company in the field of sustainability”.

Organization Performance is often described as Return on Assets (ROA), Return on Equity (ROE), and Return on Investment (ROI) and sales growth, etc. Researchers often use financial statements to measure firm performance. Since we measured the other dimensions using self-reported approach; hence, we also used the same procedure (self-reported) to measure organizational performance. CEOs and top managers were asked to rate their organization performance based on the ROA, ROE and ROI etc. as compared to their closed competitors over the last three years. We used 6 items to measure organization performance that is adopted from prior studies (e.g., [87]) to gain more useful insights.

Scales: For independent and mediator measures, we used five Likert scales showing strongly disagree (1) to strongly agree (5). For organization performance, we used five Likert scales and used a range from extremely declined (1) to extremely improved (5).

### 3.3. Control

For the purpose of reducing spurious results, we controlled for the factors CEOs and managers education and age of firms, as these can significantly influence performance. Both education of CEOs/Managers and age of firms have a significant influence on organization performance as presented in the structural model.

### 3.4. Data Analysis

We executed descriptive statistics to calculate mean values, standard deviation (S.D) and data normality that have been presented in Table 2. The results show that that the highest mean value is of organization performance (e.g., 3.71) and the lowest value is of MI (e.g., 3.26). Organization performance also shows the highest S.D. (e.g., 0.443) and the lowest is of MI (e.g., 0.395). Our data are normal as all the variables have their skewness and kurtosis values in the acceptable range  $+/-2$  as suggested by George and Mallery [88].

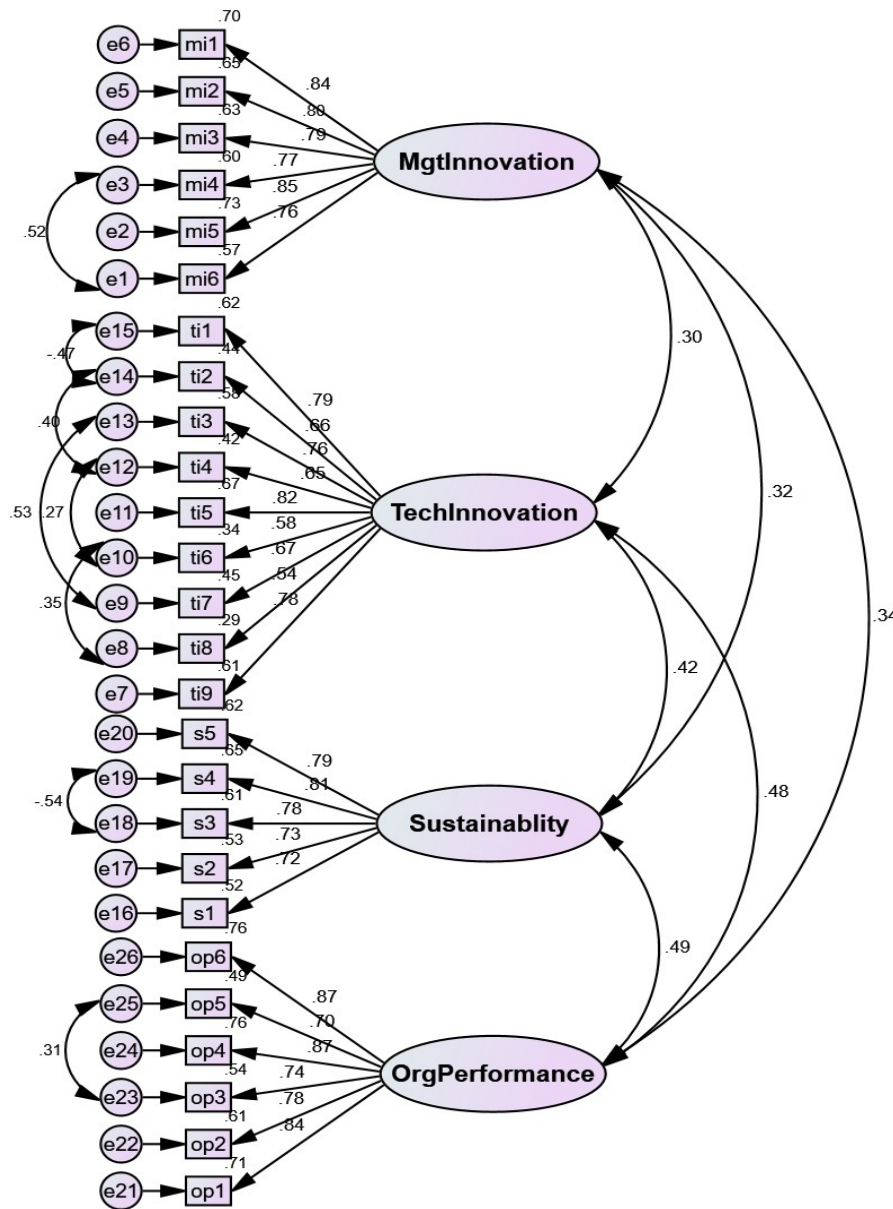
**Table 2.** Descriptive statistics.

Variables	Minimum	Maximum	Mean	S.D.	Skewness	Kurtosis
Mgt. Innovation	1.43	4.39	3.2682	0.39558	-0.375	1.728
Tech. Innovation	1.36	5.00	3.6153	0.44006	-0.428	1.503
Sustainability	1.39	4.50	3.3182	0.40703	-0.173	1.675
Org. Performance	1.32	4.96	3.7101	0.44370	-1.108	1.100

### 3.5. Confirmatory Factor Analysis

Confirmatory Factor analysis (CFA) was performed to check the validity and reliability of variables used in this research. First, we tested the measurement model (see Figure 1) where all the variables were included. We found an acceptable model fit in terms of  $\chi^2/df$  as the value is 2.135 which is less than 3, as recommended by [89,90]. The other models fits; GFI, AGFI, CFI, TLI and NFI provided acceptable values (e.g., closed or above 0.90) as suggested by prior studies [90]. Similarly, RMR and RMSEA also gave acceptable values (e.g., below 0.080) which presents an adequate model fit as recommended by Hiar et al. [89]. All the factors were significantly loaded ( $p < 0.01$ ) on their respective constructs (see Table 3).





**Figure 1.** Measurement Model 1. Model fits:  $\chi^2/df = 2.235$ , GFI = 0.87, AGFI = 0.84, CFI = 0.94, TLI = 0.89, NFI = 0.89, RMR = 0.015 and RMSEA = 0.061.

We checked convergent validity which also referred to as Average Variance Extracted (AVE) that is shown in Table 4. Hair et al. [89] recommended that AVE value will be higher than 0.50 to acquire acceptable convergent validity. In our study, all the factors have acceptable values (e.g., greater than 0.50) which confirmed that the items explain sufficient variance in the relevant factors. We also tested discriminant validity (square root of AVE) to know if the items explain unique variation in the particular constructs and did not overlap with each other. A value above 0.70 confirmed an acceptable validity as suggested by Hair et al. (2010) and we achieved this target in this research (see Table 4). Finally, we tested composite reliability to know if the items are consistent with each other and are reliable. The results confirmed that all the items are authentic as the value of each construct was higher than the cutoff value 0.70, as suggested by Nunnally and Bernstein [91].

Table 3. Factor loadings.

S.No.	Variables and Items	Estimate
<b>Management Innovation</b>		
mi1	Rules and procedures within our organization are regularly renewed.	0.838
mi2	We regularly make changes to our employees' tasks and functions.	0.804
mi3	Our organization regularly implements new management systems.	0.793
mi4	The policy with regard to compensation has been changed in the last three years.	0.773
mi5	The intra- and inter-departmental communication structure within our organization is regularly restructured.	0.852
mi6	We continuously alter certain elements of the organizational structure.	0.758
<b>Technological Innovation</b>		
ti1	We are able to produce products with novelty features	0.788
ti2	We use the latest technology for new product development	0.665
ti3	The speed of new product development is fast enough/competitive	0.759
ti4	We have enough new products introduced to the market	0.650
ti5	We have new products which are first-in-market (early market entrants)	0.816
ti6	We are technologically competitive	0.583
ti7	We use up-to-date/new technology in the process	0.668
ti8	We are fast in adopting process with the latest technological innovations	0.540
ti9	The process, techniques and technology change rapidly in our company	0.778
<b>Sustainability</b>		
s1	We are the first that offer environmental-friendly products/services at the marketplace.	0.722
s2	Our competitors consider us as a leading firm in the field of sustainability.	0.726
s3	We develop new products/services or improve existing products/services that are regarded as sustainable for society and environment.	0.781
s4	Our reputation in terms of sustainability is better than the sustainability reputation of our competitors.	0.809
s5	Compared to our competitors, we more thoroughly respond to societal and ethical demands.	0.790
<b>Organization Performance</b>		
op1	Return on Assets	0.840
op2	Return on Equity	0.784
op3	Return on Investment	0.736
op4	Sales growth	0.871
op5	Market shares	0.701
op6	Net profitability	0.872

Table 4. Correlation, validity and reliability.

Variables	AVE	C.R.	1	2	3	4	5	6
Education	-	-	1					
Age	-	-	0.074	1				
Mgt. Innovation	0.64	0.92	0.071	0.110	0.80			
Tech. Innovation	0.50	0.89	0.112	0.219 **	0.325 **	0.70		
Sustainability	0.58	0.88	0.047	0.192 **	0.346 **	0.460 **	0.76	
Org. Performance	0.64	0.91	0.202 **	0.440 **	0.366 **	0.514 **	0.525 **	0.86

Note: \*\* Significant at level ( $p < 0.01$ ). Discriminant validity (e.g.,  $\sqrt{\text{AVE}}$  is presented as a bold parallel to correlation.

### 3.6. Common Method Bias

Harman's One-factor test was applied in SPSS to check for Common Method Bias (CMB). We found four factors that had an eigenvalue greater than 1. Moreover, the first factor explained only 33.97% that was lower than 50%. Hence, it was confirmed that there was no threat of common method bias [92]. Besides, we also tested the influence of a common latent factor in a measurement model and confirmed that that CMB was not threatening the results of our study.

3.7. Correlation

Pearson correlation was executed in SPSS and the results are shown in Table 4. We found a significant relationship between MI and organization performance ( $r = 0.366, p < 0.01$ ) and also a significant relationship existed between MI and sustainability ( $r = 0.346, p < 0.01$ ). TI is significantly related to organization performance ( $r = 0.514, p < 0.01$ ) and also significantly related to sustainability ( $r = 0.460, p < 0.01$ ). Sustainability and organization performance have significantly relationship ( $r = 0.525, p < 0.01$ ). None of the correlation values were greater than 0.80, which confirmed the absence of multi-collinearity.

3.8. Structural Models

We performed several structural models to discover the relative contribution and role of MI and TI in sustainability and organization performance.

3.8.1. Structural Model 1

In this structural model (see Figure 2), we checked the influence of MI and TI on organization performance. First, we ensured the model fit and the values of  $\chi^2/df = 2.470$ ,  $GFI = 0.87$ ,  $AGFI = 0.84$ ,  $NFI = 0.88$ ,  $RMR = 0.038$  and  $RMSEA = 0.070$  were found in the acceptable range as per the recommendation of the prior studies [89,90].

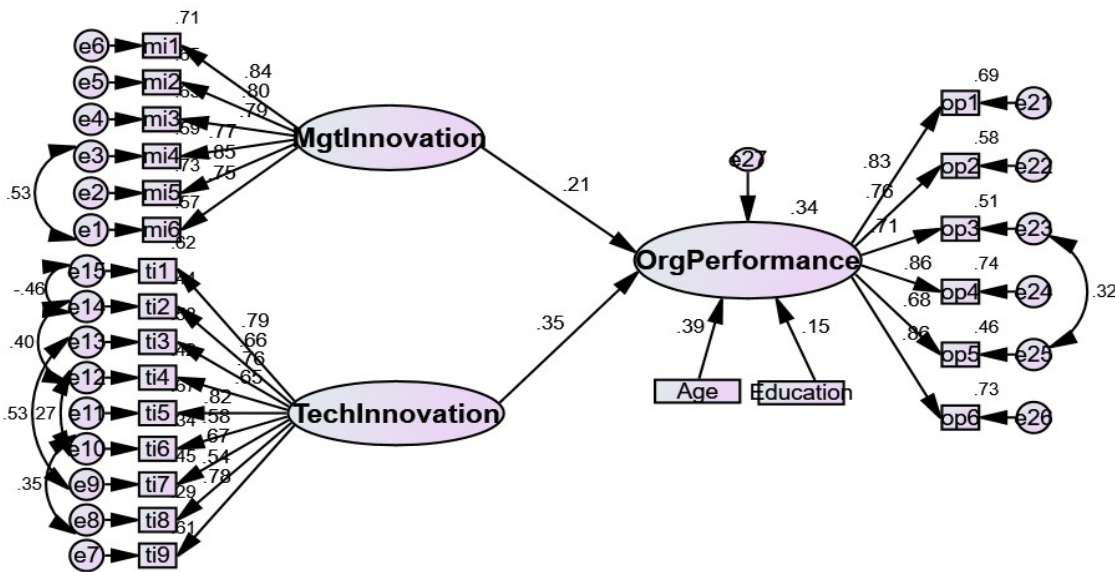


Figure 2. Structural Model 1.

The results show that MI has a significant influence on organization performance ( $\beta = 0.227, p < 0.05$ ) that supported H1 of the research. We also found that TI significantly contributes to organization performance ( $\beta = 0.329, p < 0.05$ ) and supported H2. Both control variables; the age of firms and education have a significant influence on organization performance. Looking to the relative importance, TI is more critical for organization performance as compared to MI in our sample.

3.8.2. Structural Model 2

The influence of MI and TI on sustainability was checked in this structural model (see Figure 3). The model fit  $\chi^2/df = 2.332$ ,  $GFI = 0.88$ ,  $AGFI = 0.85$ ,  $NFI = 0.88$ ,  $RMR = 0.037$  and  $RMSEA = 0.066$  were found in the accepted range [89,90].

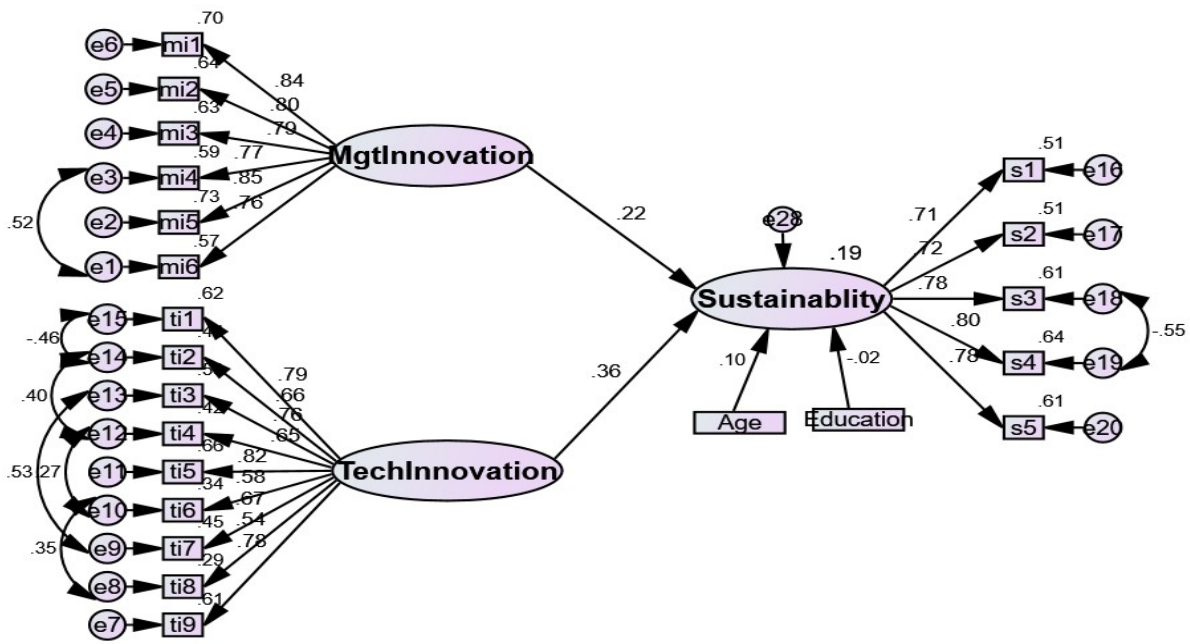


Figure 3. Structural Model 2.

The results indicated that MI and TI had a significant influence on sustainability ( $\beta = 0.223$ ,  $p < 0.05$ ) and ( $\beta = 0.318$ ,  $p < 0.05$ ) supported H3 and H4, respectively. The control variables age and education did not have a significant influence on sustainability. TI is also more important for sustainability as compared to MI.

3.8.3. Structural Model 3

To check the impact of sustainability on organization performance, we executed structural model 3 (see Figure 4). The values of model fit  $\chi^2/df = 2.967$ , GFI = 0.92, AGFI = 0.88, NFI = 0.92, RMR = 0.026 and RMSEA=0.08 showed acceptable figures [89,90].

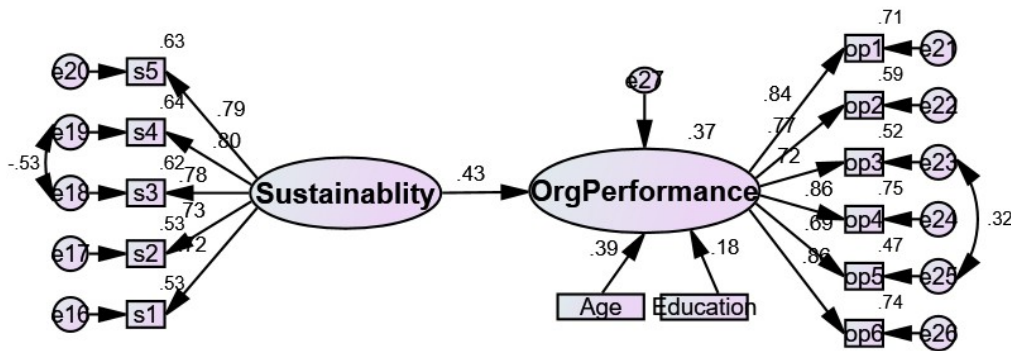


Figure 4. Structural Model 3.

The results provided excellent support to the proposed H5 as the sustainability has a significant influence on organization performance ( $\beta = 0.454$ ,  $p < 0.05$ ). Both the control variables age of firms and education have a significant impact on organization performance.

3.8.4. Structural Mode 4

The structural model in AMOS was executed to check either sustainability fully or partially mediates (see Figure 5). We first confirmed the model fits e.g.,  $\chi^2/df$ , GFI, AGFI, NFI, RMR

and RMSEA etc. that provided values in the acceptable range (see model fits under Figure 2) as recommended by [89,90].

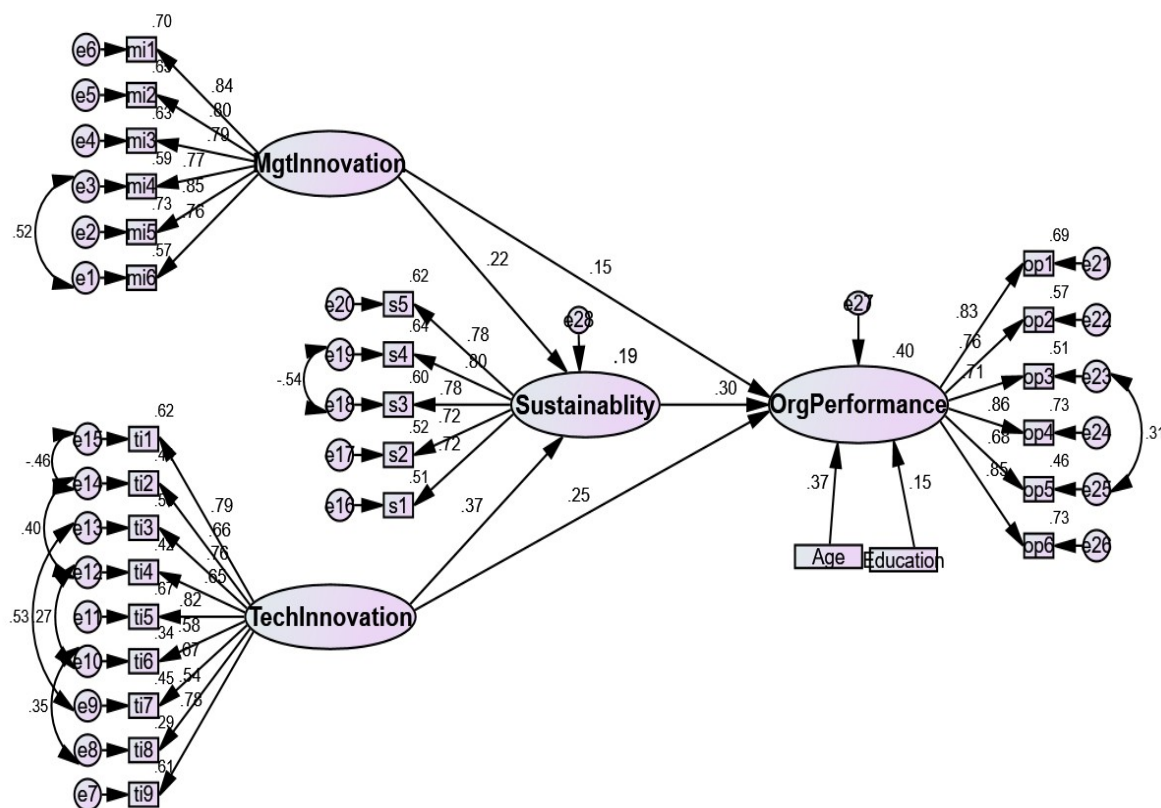


Figure 5. Structural Model 4. Model fits:  $\chi^2/df = 2.148$ , GFI = 0.86, AGFI = 0.83, CFI = 0.93, TLI = 0.92, NFI = 0.87, RMR = 0.034 and RMSEA = 0.062.

The results showed (see Table 5) that the indirect impact of MI on organization performance was significant ( $\beta = 0.066, p < 0.05$ ) while the direct effects also remained significant ( $\beta = 0.150, p < 0.05$ ) which partially supported H6. Similarly, the indirect influence of TI on organization performance was significant ( $\beta = 0.110, p < 0.05$ ) and the direct impact also remained significant ( $\beta = 0.247, p < 0.05$ ) that partially supported H7. Thus, in our study, sustainability played a partial mediating role between MI and organization performance as well as between TI and organization performance. Both control variables; the age of firm and education of CEOs and top managers had a significant influence on organization performance. R square demonstrates that MI and TI explained 19% variance in sustainability while the other factors explained 40% variance in organization performance (through mediating role of sustainability).

Table 5. Direct and indirect influence on organization performance.

Hypotheses	Direct Effect	p	Indirect Effect	p	Total Effect	p
Org. Perform, MI (through Sustainability)	0.150	0.010	0.066	0.003	0.216	0.001
Org. Perform, TI (through Sustainability)	0.247	0.004	0.110	0.000	0.356	0.001
Org. Perform ← Sustainability	0.295	0.001	-	-	0.295	0.001
Sustainability ← MI	0.224	0.003	-	-	0.224	0.003
Sustainability ← TI	0.372	0.001	-	-	0.372	0.001
R <sup>2</sup> = 0.19						
Org. Perform ← Age	0.369	0.001	-	-	0.369	0.001
Org. Perform ← Education	0.155	0.004	-	-	0.155	0.004



To summarize, TI was more important for organizational performance and sustainability as compared to MI. Overall, the contribution of MI and TI to organization performance was greater than the contribution MI and TI to Sustainability.

### 3.9. Robustness Checks

To check to the robustness of the results, we executed Baron and Kenny [93] steps in SPSS. First, we tested the influence of MI and TI on sustainability (see Table 6) and found that both MI and TI significantly improved sustainability. The findings endorsed AMOS results.

**Table 6.** Regression analysis.

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.281	0.206		6.221	0.000
	Tech. Innovation	0.359	0.049	0.388	7.377	0.000
	Mgt. Innovation	0.226	0.054	0.220	4.171	0.000

Note: dependent variable = sustainability.

We tested the influence of MI and TI on organization performance (see Table 7) and confirmed that the direct impact of MI and TI on organization performance was significant. Moreover, in the presence of sustainability as a mediator, the results showed that sustainability partially mediated the relationship between MI and organization performance as well as between TI and organization performance (see 3rd model of Table 7). Hence, we argue that there was no significant difference between SPSS and AMOS outputs.

**Table 7.** Interaction analysis.

Model		Coefficients				t	Sig.
		Unstandardized Coefficients		Standardized Coefficients			
		B	Std. Error	Beta			
Step 1	(Constant)	3.024	0.083		36.628	0.000	
	Age	0.236	0.028	0.427	8.386	0.000	
	Education	0.083	0.025	0.171	3.350	0.001	
Step 2	(Constant)	1.127	0.199		5.658	0.000	
	Age	0.182	0.025	0.329	7.340	0.000	
	Education	0.060	0.021	0.123	2.791	0.006	
	MgtInnovation	0.228	0.052	0.203	4.388	0.000	
Step 3	TechInnovation	0.365	0.048	0.362	7.671	0.000	
	(Constant)	0.715	0.199		3.589	0.000	
	Age	0.168	0.023	0.303	7.133	0.000	
	Education	0.062	0.020	0.128	3.082	0.002	
	MgtInnovation	0.155	0.050	0.139	3.092	0.002	
	TechInnovation	0.254	0.048	0.252	5.250	0.000	
	Sustainability	0.324	0.052	0.297	6.210	0.000	
Step 4	(Constant)	-0.623	0.662		-0.942	0.347	
	Age	0.164	0.023	0.296	7.208	0.000	
	Education	0.058	0.019	0.120	2.999	0.003	
	MgtInnovation	1.763	0.334	1.572	5.273	0.000	
	TechInnovation	-0.830	0.264	-0.823	-3.143	0.002	
	Sustainability	0.711	0.201	0.652	3.531	0.000	
	MI × Sustainability	-0.487	0.100	-2.389	-4.860	0.000	
TI × Sustainability	0.334	0.081	1.873	4.154	0.000		

Dependent Variable: Org Performance.

### 3.10. Interaction Analysis

In order to clear the deep role of sustainability in the business sector in terms of innovation and performance, we included an additional model to check the interaction term of sustainability × MI and sustainability × TI that has been presented in Table 7. The direct influence of MI and TI in step 2, holding for mediating role of sustainability in step 3 is also significant, showing that sustainability had a significant (but partial) role in the model. In step 4 of the regression, the interaction terms of sustainability × MI and sustainability × TI were significant and the direct signs of MI and TI were also significant, which indicated that the signs associated to these coefficients suggest the very direction that organizational performance is affected by MI and TI.

The instantaneous rate of change MI changed enough (e.g., from 0.155 to 1.763) when interaction term of sustainability was applied. Similarly, TI also changed from 0.254 to −0.830 during the interaction term of sustainability. Sustainability as a mediator was significant (0.711) in step 4. However, the interaction term of sustainability with MI showed a negative result, but with TI showed a positive result. Nevertheless, the significant values of both interaction terms showed that direct and interaction terms of sustainability affected and can change the performance. However, the change was not guaranteed, but depended on the scale and how the factors are measured.

Though, the formal hypothesis was not proposed to check if MI leads to TI, but there may be a possibility that MI can lead to TI. For this, we applied the structural model 6 (see Figure 6) to know if there should be an argument that MI endeavors could ultimately lead to improved TI. The model fitness in term of chisq/df, GFI, AGFI, NFI, RMR and RMSEA were ensured as per recommendation from prior studies [89,90]. The results indicated that MI significantly lead to TI ( $\beta = 0.307, p < 0.05$ ). Hence, we argue that there is a significant chance that MI can bring TI with organizations.

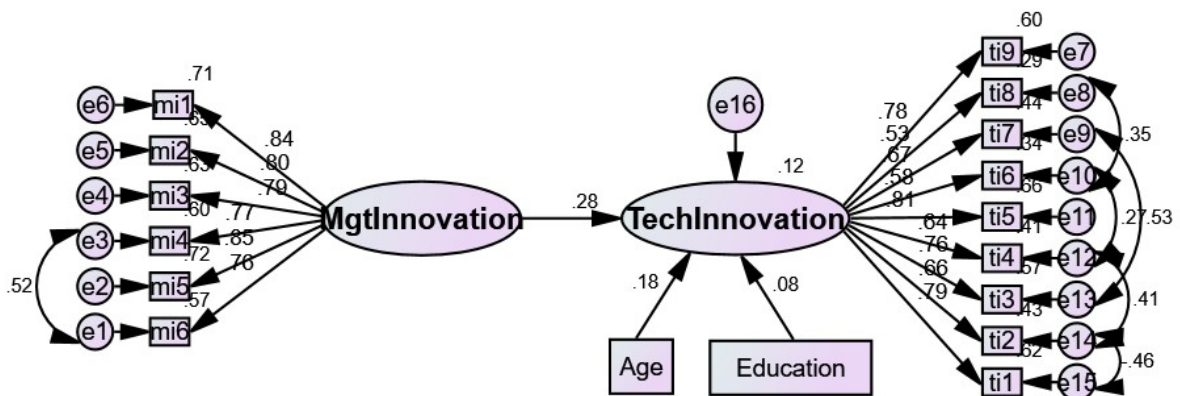


Figure 6. Structural Model 5.

## 4. Discussion

This study tested the mediating role of sustainability between MI and organization performance as well as between TI and organization performance. Though, several studies have examined the direct relationship between MI and organization performance (e.g., [20]) and TI and organization performance [36], especially in developed markets. However, this research is an attempt to test the model based on empirical evidence collected from an emerging economy. We hereby confirmed that sustainability significantly improves financial performance in emerging markets. The confronting theories suggested by Yu and Zhao, [38] can be properly answered in our research by concluding a significant positive relationship between sustainability and financial performance. Additionally, our findings strongly favor the RBV theory, which demonstrates that a firm with unique and useful resources and capabilities can get a sustainable competitive position and superior performance in a market [40]. We also confirmed that a firm with innovation capabilities could achieve its goal to make a sustainable position and outperform competitors in a turbulent market. In a similar view (e.g., from

an RBV perspective), we argue that TI as a capability, stimulates firm internal structure and process to enhance performance. Moreover, this research also assesses the theme of the upper echelon theory which indicates the role of top management in organizations is critical in outcomes and success [41]. We argue in this research that senior management through innovative practices can spur organization performance in emerging markets.

This study confirmed that MI and TI have a significant influence on organization performance that supported H1 and H2 of our research. Consistent with Azar and Ciabuschi [78] who scrutinized that in the turbulent market, MI and TI are significant predictors that can enhance organizational performance. Moreover, Mol and Birkinshaw [50] pointed out that MI helps organizations in different ways but it significantly improves its performance and productivity. Additionally, it is indicated that MI innovation helps the organization to achieve high performance by integrating various practices within organizations in novel ways. More precisely, MI is a significant driver of organization performance [21,53]. From TI perspective, our findings are consistent with Kim and Choi [94] who pointed out that any improvement in IT innovation can significantly improve organization efficiency and financial performance.

We found that MI and TI significantly positively contribute to organizational sustainability that supported H3 and H4 of our research. In line with Vaccaro et al. [25], who claimed that MI is slightly tricky to adapt, but in fact it can significantly improve the sustainable competitive advantage. Moreover, to achieve sustainability in the current era of globalization, firms use different approaches. However, out of many paths, MI has been deemed a significant factor especially in emerging markets [64]. Referring to the role of TI, our results are closed to Yang et al. (2018) who described that TI is a vital factor that enhances enterprises sustainability and competitive advantage. Moreover, Son et al. [23] said that TI improves different internal and external processes of an organization and systematically significantly improves firm value sustainability.

We concluded that sustainability significantly enhances organization performance that supports H5 of our research. In line with Eccles, Ioannou and Serafeim [4] who found that sustainability facilitates firms to gain high performance in the long run. Moreover, Alonso-Almeida et al. [75] suggested that sustainability practices spur firms' performance in a difficult time. Hence, managers are strongly recommended to enhance sustainability as it can significantly contribute to firm competitive performance [76]. Moreover, sustainability practices lead to high performance in organizations [8].

We resulted that sustainability partially mediates the relationship MI and organization performance as well as between TI and organization performance that partially supported H6 and H7 of the study. Unlike Smith and Tushman [79] who claimed that top managers with innovative skills and capabilities first acquire valuable resources that configure sustainability and then lead to high performance. Our findings may endorse the findings of Maletič et al. [95] who found that innovation performance fully mediates the relationship between sustainability practices and economic performance. To summarize our results confirmed that sustainability is a partial mediator between MI and organization performance as well between TI and organization performance in emerging economies.

#### 4.1. Implications for Practices

To examine the influence of MI and TI on organization performance and the mediating role of sustainability remains the aim of this research. Based on empirical evidence, our model offers several guidelines for top managers, CEOs and practitioners for shaping their policies and strategies for sustainability and superior performance. Sustainability practices boost and the path to high financial performance in emerging economies. We recommend business organizations to emphasize TI and MI to enhance sustainability and performance rather engaged in traditional practices and mass production. Specifically, firms operating in emerging markets such as Pakistan, are advised to focus TI and MI. Organizations that are more likely to acquire a sustainable competitive position and superior performance can promote MI and can adopt TI. Our findings provide valuable insights

into the decision-making process and inform managers to make proper decisions e.g., invest in MI and TI, instead of spending lots of resources in risky options for sustainability and high performance. Promotion of TI and MI is vital because of the recent trend of globalization. The traditional approaches may not provide adequate results in the current era. Hence, business organizations, especially in turbulent markets, need innovative practices (technological and non-technological) to survive in the long run. The implications can be equally applied in other emerging and developed economies as Pakistan has many features in common with other countries [96].

#### 4.2. Limitations and Future Research

Despite having several implications, this research is not free of constraints that should be considered in future studies. In particular, our review is limited to the significant types of innovation (e.g., MI and TI) only. Though, there are several innovations; process innovation, product innovation, organization innovation, and marketing innovation etc. that may influence organizations sustainability and performance. To explore the unique influence of each innovation, there is much to be done to more fully conceptualize, and subsequently empirically examine this area. Similarly, we used only six dimensions to measure organization performance. Other dimensions (non-financial performance, economic performance, customer performance etc.) should be considered in future studies to articulate the results in a better way. Alternatively, Anwar [57] claimed that business model innovation significantly influences competitive advantage and performance. The question “does sustainability mediate the relationship between business model innovation and performance?” can be answered in future studies. MI and TI may need enough financial capital; we recommend this zone (e.g., financial capital) for future researchers to study in order to acquire better outputs. Moreover, this model can be tested on several data sets; manufacturing, trading, and services separately to explore what type of innovation can significantly enhance sustainability and performance in a particular industry.

### 5. Conclusions

This research provides a clear picture about competing theories (e.g., value creating theory and value-destroying theory) related to the relationship between sustainability and financial performance, and RBV theory. The value creating theory believes in the significant positive influence of sustainability on financial performance while value destroying theory believes in losing financial performance by focusing on social and environmental practices. The additional theory of RBV states a significant positive relationship between a firm’s unique resources and performance, which was also addressed in this research. Considering the mixed findings of prior studies, this research is an attempt to examine the role of MI and TI in the performance of organizations with a mediating role of sustainability. To test this model, we applied Structural Equation Modelling in AMOS and SPSS analyses of the empirical evidence collected from 304 CEOs and top managers. The results indicate that MI and TI significantly positively contribute to sustainability and organization performance. Sustainability plays a partial mediating role between MI and organization performance and also between TI and organization performance. This research confirms a significant positive influence of sustainability on financial performance—hereby supporting value creating theory while opposing value destroying theory. Considering the substantial role in MI and TI, our research favors the RBV theory and recommends that firms should emphasize their internal capabilities (hereby deemed MI and TI) to gain superior performance. Our findings scrutinized that TI is more critical for firm sustainability and high performance as compared to MI in the emerging economy of Pakistan. Top management of organizations have to give enough attention to configure MI in various departments as it significantly spurs performance and sustainability (e.g., [50]). Organizations are recommended to focus on both types of innovations instead believing in one as these innovations (MI and TI) are the significant predictors of sustainability and financial performance. To summarize, we recommend CEOs and top managers give due attention to the adoption of MI and TI to survive the long run.

**Author Contributions:** U.K. and S.L. conceived of the presented idea. U.K. developed the theory and performed the computations. Y.Z. and M.S. verified the analytical methods. Supervision, Y.Z. writing original draft, U.K. All authors discussed the results and contributed to the final manuscript.

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