Article

Impact of Entrepreneurial Leadership on Product Innovation Performance: Intervening Effect of Absorptive Capacity, Intra-Firm Networks, and Design Thinking

Khaliq Ur Rehman [1,2,*], Farhan Aslam [1,*], Mário Nuno Mata [3,4], José Moleiro Martins [3,5], António Abreu [6,7], António Morão Lourenço [4] and Sabita Mariam [8]

1 School of Management, Wuhan University of Technology, Wuhan 430070, China
2 Office of Research Innovation and Commercialization (ORIC), University of Management and Technology, Lahore 54782, Pakistan
3 Lisbon Accounting and Business School, Lisbon Polytechnic Institute, 1069-035 Lisboa, Portugal; mnmata@iscal.ipl.pt (M.N.M.); zdmmartins@gmail.com (J.M.M.)
4 Polytechnic Institute of Santarém, School of Management and Technology (ESGTS-IPS), 2001-904 Santarém, Portugal; antonio.lourenco@esg.ipsantarem.pt
5 Instituto Universitário de Lisboa (ISCTE-IUL), Business Research Unit (BRU-IUL), 1649-026 Lisboa, Portugal
6 Lisbon Higher Institute of Engineering (ISEL), Lisbon Polytechnic Institute, 1959-007 Lisboa, Portugal; ajfa@dem.isel.ipl.pt
7 CTS Uninove, Faculty of Science and Technology, New University of Lisbon, 2829-516 Lisboa, Portugal
8 Department of Business Administration, Government College Women University, Faisalabad 38000, Pakistan; sabitamariam@gcwuf.edu.pk
* Correspondence: khaliqcheema@gmail.com (K.U.R.); aslam.farhan@outlook.com (F.A.); Tel.: +92-3068484392 (K.U.R.)

Abstract: The main objective of this research is to investigate the nexus between entrepreneurial leadership and product innovation performance. In addition, the mediating mechanism of absorptive capacity, intra-firm networks, and design thinking through which entrepreneurial leaders influence product innovation performanceis also studied. The researcher contacted three hundred (300) plus firms; 157 firms showed a willingness to participate, and 96 firms provided the data with a response rate of 61.15%. Out of those 96 firms, the data from 71 firms were used for the final analysis, yielding an effective response rate of 45.22%. Only middle and top-level employees from the marketing and research & development departments from Pakistani firms were selected as respondents because these two departments are directly related to product innovation performance. To test the hypothesis, the Smart PLS-SEM technique wasused. The empirical analysis revealed that entrepreneurial leadership impacted product innovation performance through the mediating mechanism of design thinking, intra-firm networks, and absorptive capacity. The current research contributes to entrepreneurial leadership theory by proposing and empirically testing how entrepreneurial leaders affect product innovation performance.

Keywords: entrepreneurial leadership; product innovation performance; risk; design thinking; intra-firm networks; absorptive capacity

1. Introduction

Recently, the importance of product innovation performance has increased manifold due to globalization, technological advancements, and the shortening of product life cycles. The purpose of this paper is to investigate the impact of the entrepreneurial leadership functional mechanism on the product innovation performance of firms. To achieve the objective, two research questions were formed: What is the connection between entrepreneurial leadership and product innovation performance? How doesthe mechanism of design thinking, intra-firm networks, and absorptive capacity help entrepreneurial leaders to improve and influence product innovation performance?

This study, however, studied product innovation performance from the perspective of entrepreneurial leadership and its mechanism, which is comprised of the intra-firm networks, design thinking, and absorptive capacity.

The role of entrepreneurship and leadership is studied by many scholars in relation to product innovation performance and the creation of an ecosystem for innovation. Joseph A Schumpeter [1] and the OECD [2] acknowledge leadership and entrepreneurship as main drivers for innovation. Traditionally, these two concepts are discussed separately in the literature; however, Thornberry (2007) synergized these concepts together and presented his famous entrepreneurial leadership theory with five distinct dimensions of entrepreneurial leadership. These are discussed in Sections 2 and 3. Entrepreneurial leadership is at the crossroad of leadership and entrepreneurship and is about exploring an opportunity and then pushing others to collaborate for the exploitation of the opportunity by creating an environment conducive for innovation.

Previous studies have mainly examined the relationship between entrepreneurial leadership and innovation performance from the perspective of idea generation and diffusion, personal qualities, and other behavioral and psychological aspects of entrepreneurial leadership [3], overlooking the functional mechanism and tools through which entrepreneurial leadership affects innovation performance. Entrepreneurial leadership is all about creating a "climate" suitable for innovation that works through the mechanism of collaboration, problem-solving thinking, and knowledge management [4]. Previous studies have been unable to explore the mechanism through which entrepreneurial leadership influences the innovation performance. The current research proposes and empirically teststhe mediating functional mechanism of design thinking, intra-firm networks, and absorptive capacity.

Significance of the Study

The present study suggests a functional mechanism in the form of networking and design thinking through which entrepreneurial leadership affects product innovation performance. Furthermore, the present study suggests the use of design thinking as a tool for pro-active and problem-solving thinking, which is one of the main attributes of entrepreneurial leadership [5]. In addition to this, the current study also has some profound contributions; first, it proposes and empirically tests a mechanism through which entrepreneurial leadership affects product innovation. Second, it proposes a tool of design thinking to complement the pro-active and problem-solving characteristics of entrepreneurial leadership, hence contributing to the theory of entrepreneurial leadership by synergizing it with the theory of design thinking.

2. Literature Review and Theoretical Framework

2.1. Product Innovation Performance

Joseph A. Schumpeter and the Organization for Economic Cooperation and Development (OECD) have highlighted that innovation and entrepreneurship are the main strategic stimuli behind competitive advantage and economic development [1]. Chryssochoidis [6] is of the view that product innovation performance is the prime manifestation of innovation inan organization and plays a critical role in improving the competitiveness and the competitive advantage of the organization, thus ensuring economic development. Product life cycles are getting shorter; out of the box thinking is called for to improve the product innovation performance for rapid product development and commercialization [7].

The difference between product innovation and product innovation performance is obvious. Product innovation refers to "the introduction of goods and services that is new or significantly improved with respect to its characteristics or intended uses. This includes significant improvement in technical specifications, components, and materials, incorporated software, user-friendliness or other functional characteristics". Product innovation performance refers to the "firm's effectiveness and efficiency in new product development measured as the extent to which the firm has achieved its market share and profitability objective" [8]. Product innovation performance is an outcome of successful

knowledge exploitation and includes different technical and non-technical aspects starting from research and development to design, and the management of the manufacturing process to commercial activities that include the marketing of new or improved products [9].

Product innovation performance consists of two very important and complementary dimensions: product innovation efficiency and product innovation efficacy. Product innovation efficacy represents the degree of success whereas product innovation efficiency represents the efforts spent (time, resources, etc.) to achieve a certain degree of success. Product innovation performance starts with discovery (idea generation) and ends with implementation (commercial activities) [10]. Besides effectiveness and efficiency, another important element of product innovation performance is implementation. A new or significantly improved product (good or service) is considered as implemented when they are offered to actual or potential users in the real environment [11].

2.2. Entrepreneurial Leadership

Leadership and entrepreneurship are considered as the main drivers for innovation; traditionally these two concepts have been discussed separately in the literature, however, both concepts can be synergized together by combining the characteristics of transformational, transactional, and charismatic leadership with the DNA and IQ of entrepreneurship [12]. Thornberry [13] has presented the theory of entrepreneurial leadership by highlighting five distinct dimensions that are discussed in the following paragraph.

General entrepreneurial leadership behavior (GELB) is all about creating an environment conducive for innovation where followers can feel motivated to innovate and where their innovation accomplishments are recognized and acknowledged. Explorer behavior (EXPB) is an entrepreneurial leader's ability to explore the opportunities around him and to exploit them by pushing the organizational limits of innovation and creativity. Miner behavior (MINB) on the other hand relates to the entrepreneurial leader's ability to create a sustainable competitive advantage for their organization by introducing and applying new innovative approaches and techniques to people, processes, and procedures. Furthermore, the accelerated behavior (ACCB) of entrepreneurial leaders is aimed at creating an innovative environment for others by using the skills of pro-active and problem-solving thinking, thus accelerating the process of innovation. Finally, the integrated behavior (INTB) of entrepreneurial leaders means the application of the inherent innovative and creative thinking mindset of entrepreneurial leaders across the organization through effective communication and coordination [14].

Pisapi [5] also focused on entrepreneurial leadership that is at the crossroad of leadership and entrepreneurship and is all about seeking opportunities and then pushing others to collaborate for opportunity exploitation by creating an environment conducive for innovation and knowledge sharing. Gupta [15] further explained that entrepreneurial leadership theory is all about fusing leadership with the concepts of entrepreneurship, entrepreneurial orientation, and entrepreneurial management. Esmer [16] defined entrepreneurial leadership as a function of leadership and entrepreneurship in equation form as Entrepreneurial Leadership = f (Entrepreneurship, Leadership).

2.3. Design Thinking

The OECD [2] stressed the fact that innovation should be user-centered and implementable. Several previous studies have also highlighted the importance of the user/human centeredness of innovation and the need for creative problem-solving thinking to foster innovation [17]. Design thinking theory states that thinking like a designer is the most effective creative problem-solving approach for complex problems and the outcome of the design thinking would be a user/human-centered product [18]. Design thinking acts as a bridge between the innovation ecosystem and the corporate strategy of the firm, resulting in innovations that are at a par with the needs of the era of IoT and industry 4.0 and 5.0 [19].

Tim Brown described design thinking as a discipline that uses the designer's sensibility and methods to match people's needs as to what is technologically feasible and what a

viable business strategy can convert into customer value and market opportunity [20]. Design thinking is "bringing innovation to the market by converting learning from users into viable business outcomes" [21]. As a result, companies can expect to obtain more "desirable solutions" that offer "creative alternatives" which go "beyond esthetics" and are "sophisticated experiences" that are "emotionally satisfying and meaningful" as well as a "combination of product, services, spaces and information". Corporate entrepreneurship, from where the concept of entrepreneurial leadership emerges, works through design thinking; this relates to opportunity recognition, effectuation, the intersection of design thinking and entrepreneurship strategy, and entrepreneurial design management [22].

2.4. Intra-Firm Networks

Intra-firm networks refer to the intensity of the interactions among functional units of an organization. More explicitly, intra-firm networks are about internal networks formed by the functional areas e.g., R&D, manufacturing, marketing, etc. of the firm. Although knowledge is available in the literature on the relationship between innovation performance and intra-firm networks, little has been discussed in relation to how firms can organize intra-firm networks to obtain the maximum out of the innovation potential hidden in intra-firm networks. It is a well-established fact that individuals and organizational mechanisms that formintra-firm networks support knowledge management, i.e., knowledge creation, transformation, sharing, and diffusion to boost the innovation performance of firms. Organizational practices and mechanisms encouraging networking between individuals (resulting in cross-functional networking) can be both formal and informal, which has recently been attracting more attention from scholars and practitioners [23].

Khoja [24] has further stated that intra-firm networks enhance a firm's intellectual capital, i.e., a firm's knowledge ability and knowing capabilities. They define intra-firm networks as a "set of formal and/or informal relationships among business units of the same legal entity" adopted from Ravi S Achrol and Philip Kotler [25]. Under this arrangement, each functional unit has considerable freedom in making its decisions concerning resource allocation while working in close collaboration with affiliated functional units.

The previous literature on intra-firm networks has mainly focused on three types of ties based on different types of communication i.e., task-related communication, advice related communication, and social communication. Other types of ties may include friendship, exchange, collaboration, and spatial closeness. Moreover, intra-firm networks also include formal and informal communication, and informational flow between both hierarchal layers and among individuals from different functional subunits of the organization. Furthermore, intra-firm collaboration is the essence of intra-firm networks, based on the urge to exchange different views, skills, and expertise possessed by individuals belonging to different functional units [26]. Another study concluded that intra-firm networks mean that organizations are networks of individuals that all have their specific characteristics, and that intra-firm networks are comprised of individuals, cross-functional teams and/or business/functional units that are connected through formal organizational structures and hierarchies or informal personal relations [27].

2.5. Absorptive Capacity

Lichtenthaler [28] has explained that the absorptive capacity of the firm translates the flow of information into something valuable for the organization and it indirectly improves the innovation performance of the organization. He defines absorptive capacity as "an ability to recognize the value of new information, assimilate it, and apply it in commercial ends". Zahra [29] has presented a comprehensive definition of ACAP, stating, "ACAP requires learning capability and develops problem-solving skills; learning capability is the capacity to assimilate knowledge for imitation and problem-solving skills to create new knowledge-for innovation". Social exchange theory plays an important role in creating a conducive environment for organizational learning by knowledge accumulation and

diffusion within the firm, and absorptive capacity increases social exchange within the firm, thus enhancing organizational learning [30].

2.6. Hypothesis Development

Swiercz [31] has explained the relationship between entrepreneurial leadership and innovation performance, stating that entrepreneurial leadership positively influences the innovation performance of the firm. Swiercz explained the role of entrepreneurial leadership in the firm's innovation performance by stating that entrepreneurial leadership positively affects creativity and innovation. Furthermore, Mamun [32] has explained the relationship between entrepreneurial leadership, a firm's innovation performance, and its sustainability. Previous studies related to the impact of entrepreneurial leadership on innovation performance established the relationship between entrepreneurial leadership and innovation performance; however, little work has been conducted to assess the impact of entrepreneurial leadership on the product innovation performance of the firms, and therefore, building on this premise the following was postulated [33].

Hypothesis 1 (H1). *Entrepreneurial Leadership has a positive relationship with product innovation performance (PIP)*.

The theory of entrepreneurial leadership (EL) by the authors of [34] highlighted an important dimension of EL, i.e., integrated behavior (INTB) which means the application of an inherent innovative and creative thinking mindset of entrepreneurial leaders across the organization through effective communication and coordination. Similarly, different previous studies have highlighted the collaborative dimension of EL; however, they have mainly examined the relationship between entrepreneurial leadership and the innovation performance of the firm from the perspective of idea generation and diffusion, the personal qualities of entrepreneurial leaders and other behavioral and psychological aspects of entrepreneurial leadership, hence overlooking the functional mechanism of entrepreneurial leadership and its effect on the innovation performance of the firms. Entrepreneurial leadership is all about creating a "climate" suitable for innovation and one important aspect of this climate is collaboration within organizational units [35]. Furthermore, an important characteristic of entrepreneurial leadership of a collaborative nature is that it that promotes knowledge acquisition and diffusion. Entrepreneurial leadership has a positive relationship with social capital whichis the result of collaboration and networking [36]. Therefore, based on the integrative behavior (INTB) dimension of EL theory and the collaborative nature of entrepreneurial leadership and its connection with building social capital through networking, the following hypothesis was developed.

Hypothesis 2a (H2a). *Entrepreneurial leadership (EL) has a positive relationship with the intra-firm network*.

The theory of EL [37] highlighted two important dimensions of EL i.e., miner behavior (MINB) and accelerated behavior (ACCB). MINB is all about the entrepreneurial leader's ability to create a sustainable competitive advantage for their organization by introducing and applying new innovative approaches and techniques to people, processes and procedures, whereas ACCB is aimed at creating an innovative environment for others by using the skills of pro-active and problem-solving thinking, thus accelerating the process of innovation. This builds on the notion that pro-activeness and problem-solving thinking are important functional characteristics of entrepreneurial leaders [38]. This present study suggests design thinking as a tool and technique for pro-activeness and problem-solving thinking. Therefore, building on the notions of the MINB and ACCB dimensions of theory of EL and the arguments in previous studies, the following hypothesis was formed.

Hypothesis 2b (H2b). *Entrepreneurial leadership has a positive relationship with design thinking*.

Explorer behavior (EXPB) is another important dimension of entrepreneurial leadership theory presented by the authors in [37]. It relates tothe entrepreneurial leader's ability to explore the opportunities around him and to exploit them by pushing the organizational limits of innovation and creativity, complementing the integrated behavior (INTB) dimension of entrepreneurial leadership that means the application of an inherent innovative and creative thinking mindset of entrepreneurial leaders across the organization through effective communication and coordination. The primary appeal and purpose of the EXPB and INTB dimensions of entrepreneurial leadership is knowledge accumulation and diffusion across the organization. It can be deduced from the EXPB and INTB dimensions that entrepreneurial leadership plays an important role in enhancing the absorptive capacity of the firm that relates to knowledge accumulation and diffusion.

Furthermore, several previous studies including [35,39] have highlighted that knowledge acquisition and diffusion are a few of the main characteristics of entrepreneurial leadership. Ferreras [40] has studied the relationship between transformational leadership and the firm's absorptive capacity and found this relationship to be positive. Thornberry explained in his theory of entrepreneurial leadership that entrepreneurial leaders have characteristics of transformational and charismatic leadership and the DNA and IQ of entrepreneurs; therefore, it can be inferred that the relationship between entrepreneurial leadership and absorptive capacity should be positive as it is between transformational leadership and absorptive capacity. Further building on the premise presented by Musa [41] that entrepreneurial leadership creates a climate and environment conducive for knowledge accumulation and diffusion to take place, we postulate the following.

Hypothesis 2c (H2c). *Entrepreneurial leadership has a positive relationship with absorptive capacity.*

As discussed earlier, the theory and model of EL highlighted two other very important dimensions of EL, i.e., miner behavior (MINB) and accelerated behavior (ACCB). MINB refers to the entrepreneurial leader's ability to create a sustainable competitive advantage for their organization by introducing and applying new innovative approaches and techniques to people, processes, and procedures, whereas ACCB is aimed at creating an innovative environment for others by using the skills of pro-active and problem-solving thinking, thus accelerating the process of innovation. It can be induced from the MINB and ACCB dimensions that entrepreneurial leaders are problem solvers through creative and pro-active thinking. They think of out of the box solutions and introduce a new mindset, tools, techniques, processes, and procedures within the organization. The MINB and ACCB dimensions of entrepreneurial leaders are essential elements that can solve the difficult problem of innovation [42].

The modern literature related to design thinking has been identified as the main force that is helping next-generation entrepreneurs to be more effective and innovative. It has been further stated that both design thinking and entrepreneurship work in conjunction and support each other to develop an ecosystem. Furthermore, it has been stated that leaders are encouraging the design thinking practices within organizations, which validates the assumption of the current study that entrepreneurial leaders encourage and stimulate design thinking practices within the organization [43]. Von [44] studied the interplay between entrepreneurship and design thinking and declared entrepreneurs as design managers, emphasizing the point that entrepreneurs do have design thinking attributes. The authors in [45] have further stressed that design thinking contributes to an organizational culture that fosters innovation performance, and that leadership and an entrepreneurial mindset play an important role in it.

Entrepreneurial leaders "frame the problem" using pro-active and problem-solving techniques for a better innovation performance. Similarly, the authors in [38] have highlighted four points of corporate entrepreneurship from where the concept of entrepreneurial leadership emerges and works through design thinking. These include opportunity recognition, effectuation, the intersection of design thinking, and entrepreneurship strategy and entrepreneurial design management. Although they highlighted the relationship

between corporate entrepreneurship and design thinking, we now know that the concept of entrepreneurial leadership emerges from corporate entrepreneurship and shares many common characteristics, such as the use of pro-active and problem-solving thinking for "framing the problem" in hand [45]. Based on this, it was hypothesized that similar to corporate entrepreneurs, entrepreneurial leaders also use the mechanism of design thinking to frame the problem in hand for a better innovation performance. Hence, the following hypothesis was formed.

Hypothesis 3 (H3). *Design thinking (DT) mediates the relationship between EL and PIP.*

Another important dimension of entrepreneurial leadership theory is integrator behavior (INTB) which means the application of the inherent innovative and creative thinking mindset of entrepreneurial leaders across the organization through effective communication and coordination. It can be deduced from the INTB dimension that entrepreneurial leadership encourages networking within an organizational structure. Entrepreneurial leaders not only indulge in networking across the functional units of the organization, but they also create a networking environment and encourage their team members to network across functional units. The primary appeal of this intra-firm networking is to speed up the process of idea generation and sharing to reduce the time for product innovation, thus improving the product innovation of the firm. Many previous studies have stated that intra-firm networking has a positive effect on both the radical and incremental innovation performance of the firm and is defined as the intensity of interaction among the functional units of an organization [46]. Entrepreneurial leadership is collaborative in nature and this characteristic is used for a better innovation performance. Based on the INTB dimension of entrepreneurial leadership theory and the collaborative nature of entrepreneurial leadership, it can be inferred that entrepreneurial leadership uses and works through the mechanism of an intra-firm network to positively influence the product innovation performance of the firm [47]. Therefore, it was postulated that entrepreneurial leadership positively influences the product innovation performance of the firm by using an intra-firm network. Hence, the following hypothesis was formed.

Hypothesis 4 (H4). *Intra-firm networks (INTRA) mediates the relationship between EL and PIP.*

Explorer behavior (EXPB) is another important dimension of entrepreneurial leadership theory. It refers to an entrepreneurial leader's ability to explore the opportunities around him and exploit them by pushing the organizational limits of innovation and creativity, complementing the integrated behavior (INTB) dimension of entrepreneurial leadership theory that means the application of an inherent innovative and creative thinking mindset of entrepreneurial leaders across the organization through effective communication and coordination. The primary appeal and purpose of the EXPB dimension of entrepreneurial leadership is knowledge accumulation and diffusion across the organization. The absorptive capacity of the firm translates the flow of information into something valuable for the organization and it indirectly improves the innovation performance of the organization. Absorptive capacity is defined as "an ability to recognize the value of new information, assimilate it, and apply it in commercial ends".

It has been further stated that the role of absorptive capacity must be viewed in relation to organizational learning theory, resource-based view theory, and dynamic capability theory. It can be inferred from previous studies that if knowledge is assimilated and absorbed properly it will become an intangible asset of the firm in the form of a shift in thinking approach [48]. Previous studies have highlighted the fact that the absorptive capacity of the firm helps to channel information from different sources and helps to improve the overall learning and hence the mindset of the organization [49]. Entrepreneursuse knowledge diffusion and dissemination techniques for better innovation performances, by spreading and absorbing new ideas across the organization. Therefore, as entrepreneurial leadership is at the crossroad of entrepreneurship and leadership and shares characteristics from both

domains, we can infer that entrepreneurial leaders also use the technique of absorptive capacity for knowledge diffusion and dissemination, hence we can postulate the following.

Hypothesis 5 (H5). *Absorptive capacity (ACAP) mediates the relationship between EL and PIP.*

On the basis of previous literature and hypothesis the researchers have proposed this theoretical framework (Figure 1) to be empirically tested and validated.
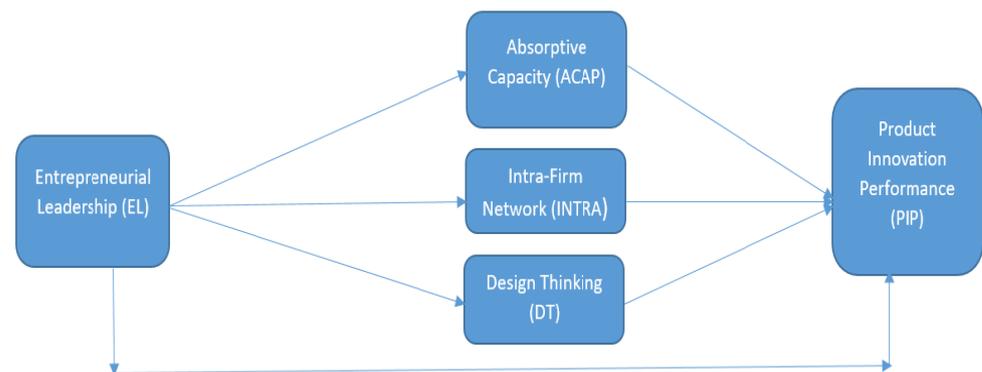
Figure 1. Theoretical Framework.

3. Materials and Methods

The middle and top-level managerial level employees from the Marketing and R&D departments from Pakistani firms were contacted for data collection. Respondents were selected from these two departments because they are directly related to product innovation performance, and thisis also in accordance with similar previous studies on product innovation performance [49]. Three hundred (300) plus firms were contacted, 157 firms showed a willingness to participate, and 96 firms provided the data, yielding a response rate of 61.15%. Out of those 96 firms, data from 71 firms (where 1 firm represented 1 team) were used for the final analysis, yielding an effective response rate of 45.22%. Three hundred and eighty (380) responses were included in the final data analysis from 71 firms (where 1 firm represented 1 team). A combination of convenience and purposive sampling was used to select firms from both the manufacturing and service sectors from the main industrial and commercial cities of Pakistan i.e., Karachi, Lahore, Islamabad, Faisalabad, Gujranwala, Gujrat, Sialkot, and Peshawar. Lists of these firms were obtained from the regulatory authorities i.e., the Securities and Exchange Commission of Pakistan (SECP), the Small and Medium Enterprises Development Authority (SMEDA), etc. A combination of self and email administrated data collection methods were used as self-administrative data collection methods to help increase the response rate and the authenticity of the results [50].

To collect the data, the current research useda previously validated questionnaire and the detail of each measurementis as follows. The measure for entrepreneurial leadership was adapted from [51] where the respondents were asked to rate their team leader or immediate manager on his/her entrepreneurial leadership abilities. The measure of collaborative intra-firm innovation networks was adapted from Schleimer [52]. The measure for design thinking was adapted from Blizzard [53]. The measure of absorptive capacity was adapted from Engelman [54]. The measure of product innovation performance was adapted from Muñoz-Pascual [10].

Our basic unit of analysis was a team, while we collected the data at the individual level. So, to reach one level, lower-level data (individual level) was aggregated to a higher level (team level). To justify the aggregation, the IRR (interrater reliability) and the IRA (inter-rater agreement) were calculated. A calculation of both the IRA and the IRA+IRR to justify the aggregation was preferred; we calculated the $r_{WG(j)}$ for IRR and ICC(1) and ICC(2) for IRA+IRR [3]. We calculated the $r_{WG\,(j)}$, ICC (1), and ICC (2) values using an Excel spreadsheet. The$r_{WG(j)}$ values for all measures used in this study were greater than the

generally accepted cut-off value of 0.70 which shows greater agreement and justifies the aggregation of data. Similarly, the ICC (1) and ICC (2) values for all measures were greater than 0.70 which shows a large effect at the significance level of $p < 0.05$. After justifying all the statistical requirements for data aggregation, the data was aggregated using SPSS.

Smart PLS was mainly used for analyzing the data using PLS-SEM, as this technique was more suited for the predictive objective of the present study. PLS-SEM is basically a complete package of statistical analyses including reliability, validity, and hypotheses testing on the basics of regression, moderation, and mediation analysis. The current research used multiple mediators to understand the depth of the mechanism through which entrepreneurial leadership influenced the product innovation performance. The PLS-SEM technique has a better predictive power over the covariance-based SEM (CB-SEM) [55,56].

4. Results

The PLS-SEM analysis was performed in a two-step process following the guidelines of Hair [57]; initially, the measurement model was assessed for reliability and validity as per the prescribed criteria. After establishing the soundness of the measurement model, the structural model was assessed.

4.1. Measurement Model

4.1.1. Convergent Validity

To assess the convergent validity of the constructs, factor loading was calculated. A factor loading of 0.70 is considered as good; however, factor loading between 0.40 and 0.70 is also acceptable. Items with afactor loading of less than 0.4 should be removed from the analysis, however, items with afactor loading between 0.40 and 0.69 should only be considered for removal if their removal increases the average value extracted (AVE) and the composite reliability beyond the threshold limit of 0.50. All the factor loadings were above 0.70 except the factor loading of ACAP-1 (0.592).However, this item was also retained for analysis as the AVE was already greater than 0.50; thus, it was retained for the sake of content validity. To further establish the convergent validity, the AVE was calculated. To establish the strong convergent, AVE should be greater than 0.50 [56,57]. The results revealed that the AVE for ACAP, DT, EL, Intra-firm and PIP was 0.631, 0.718, 0.692, 0.618 and 0.584, respectively.

4.1.2. Internal Consistency Reliability

After establishing the convergent validity for the measurement model, in the next step, the internal consistency reliability was assessed. Two measures for internal consistency reliability were calculated: Cronbach alpha and composite reliability (CR). According to the authors in [58] Cronbach alpha has statistical shortcomings as it assumes that all indicators have an equal factor loading on the construct, so it is better to calculate the composite reliability. The analysis showed that the Cronbach alpha and CR for ACAP (0.876, 0.898), DT (0.868, 0.895), EL (0.852, 0.899), Intra-Firm (0.797, 0.866) and PIP (0.857, 0.894) were within the range of the acceptable threshold of 0.60 to 0.90 [57].

4.1.3. Discriminant Validity

After establishing the internal consistency reliability, the discriminant validity was assessed for the measurement model by using the Fornell-Larcker Criterion and HTMT. In the case of PLS-SEM, HTMT has more statistical power and is superior to the Fornell-Larcker criterion to assess the discriminant validity [59,60]. The results depicted in Table 1 below show that both the Fornell-Larcker and HTMT tests passed the minimum threshold of 0.60~0.90 to establish the discriminant validity of the model.

Table 1. Discriminant Validity.

| | Fornell-Larcker | | | | | HTMT (0.60~0.90) | | | | |
	ACAP	DT	EL	INTRA	PIP	ACAP	DT	EL	INTRA	CI do not include 1
ACAP	0.783									Yes
DT	0.713	0.847				0.802				Yes
EL	0.522	0.677	0.832			0.572	0.78			Yes
INTRA	0.572	0.569	0.411	0.786		0.656	0.663	0.486		Yes
PIP	0.724	0.681	0.42	0.5	0.764	0.867	0.782	0.465	0.58	Yes

4.2. Structure Model

Before analyzing the structural model, the model was assessed for multi-collinearity issues; the inner VIF values were obtained by running the PLS algorithm with a "path weighted scheme". It was observed that all the inner VIF values were below the threshold value of five, which means that there was no collinearity issue in the model and researchers can continue with the structural model evaluation [61]. After checking the structural model for any collinearity issues, a four-step approach was adopted for the assessment of the structural model.

In the first step, R^2 was assessed for each latent variable, to establish the in-sample predictive power. The R^2 or coefficient of the determinant value expresses how much variance in a targeted variable is explained by the independent variables linked to it in a structural model. The threshold values for R^2 are 0.19 (weak), 0.33 (moderately strong), and 0.67 (substantially strong) [62]. All R^2 values in the present study except for INTRA (0.170) fell between moderately and substantially strong ranges. R^2 values in the range of 0 to 0.13 are not significant, 0.14 to 0.26 aretangent values and 0.27 and above are significant [63]. Both criteria show the very good in-sample predictive power of the structural model. The R^2 calculation revealed that entrepreneurial leadership, the intra-firm innovation network, the absorptive capacity, and the design thinking collectively explained a 64% variance in the product innovation performance. Similarly, entrepreneurial leadership explained 17%, 28.3%, and 45.8% of the variance in the intra-firm network, absorptive capacity, and design thinking, respectively. These R^2 values show the high in-sample predictive power of the model. In other words, EL together with INTRA, ACAP, and DT are good predictors of product innovation performance in a firm.

In addition to assessing and evaluating the R^2 value for all endogenous constructs in the structural model, it is also recommended to evaluate the change in R^2 when a specified exogenous construct is omitted from the structural model and to evaluate whether the omitted construct has a significant impact on the endogenous construct. This change in R^2 by omitting a specified exogenous construct is referred to as f^2 or effect size [64]. An f^2 value of 0.02 representsa small effect, a value of 0.15 representsa medium effect, and 0.35 represents the large effect of exogenous constructs [65]. The F square (f^2) values revealed that absorptive capacity (0.425) and design thinking (0.103) have a large effect size on product innovation performance whereas entrepreneurial leadership (0.022) has a small effect, and intra-firm network (0.002) has no effect. Similarly, entrepreneurial leadership has large effect sizes of 0.395, 0.844, and 0.204 on absorptive capacity, design thinking, and intra-firm network, respectively.

Furthermore, for a structural model assessment, Stone-Geisser's Q^2 Square was calculated through blindfolding. "In PLS-SEM, a Q^2 value of greater than zero for a specific endogenous reflective construct indicates path model's predictive relevance for a particular dependent construct and when the structural model shows predictive relevance, it accurately predicts data not used in model estimation". Q^2 is not a true measure of out of sample predictions but it combines aspects of in-sample explanatory power and out of sample predictions. According to previous studies, as a rule of thumb, Q^2 values of above zero, 0.25, and 0.5 show small, medium, and large predictive relevance, respectively [66]. In the present study, the Q^2 value of INTRA (0.094) showed small predictive power whereas

ACAP (0.159), DT (0.305), and PIP (0.325) showed medium predictive power. Table 2 below summarizes the results of R^2, f^2, and Q^2.

Table 2. Results of R^2, f^2 and Q^2.

Constructs	R^2	f^2				Q^2
		ACAP	DT	INTRA	PIP	
ACAP	0.283				0.425	0.159
DT	0.458				0.103	0.305
INTRA	0.170				0.002	0.094
PIP	0.640					0.325
EL		0.395	0.844	0.204	0.022	

A new technique for the true assessment of the out of sample predictive power of the model is PLS-Predict. As per the guidelines of Shmueli [67] the model under study showed a medium out of sample predictive power and relevance. As Table 3 shows below, PLS (RMSE) < LM (RMSE) for the majority of the items for the target construct, i.e., product innovation performance.

Table 3. Results of PLS-Predict.

Items	PLS-SEM(RMSE)	LM(RMSE)	PLS-SEM(RMSE)—LM(RMSE)
PIP-1	1.083	1.086	−0.003
PIP-2	1.147	1.154	−0.007
PIP-3	0.963	1.009	−0.046
PIP-4	1.081	1.059	0.022
PIP-5	0.859	0.867	−0.008
PIP-6	0.956	0.973	−0.017

After checking for the collinearity issue and model strength and quality, the path coefficients (hypothesized relationships), and their significance through bootstrapping were tested. The result of the direct relationships is presented in Table 4 below.

Table 4. Result of Direct Relationships.

Relationships	Path Coefficient	t Value	*p* Values	95% Confidence Interval	Sig *p* < 0.05	Hypothesis	Result
EL→PIP	−0.120	1.065	0.287	[−0.342; 0.105]	No	H1	Not Supported
EL→INTRA	0.412	4.263	0.001	[0.18; 0.573]	Yes	H2a	Supported
EL→DT	0.677	9.886	0.000	[0.510; 0.787]	Yes	H2b	Supported
EL→ACAP	0.532	5.754	0.000	[0.319; 0.690]	Yes	H2c	Supported

The present study followed the mediation approach, as this approach is considered as the most suitable approach for PLS-SEM [56]. The Sobel test [68] is traditionally used to test the significance of mediation relationships, however recent researchers have highlighted the statistical shortcomings of the Sobel test and recommend the use of bootstrapping to test the significance of relationships. Therefore, the bootstrapping technique was used in this study to check the significance. The result of the mediation analysis is presented in Table 5 below.

Table 5. Result of the Mediation Analysis.

	Indirect Effect	95% Confidence Interval	Sig *p* < 0.05	Direct Effect	95% Confidence Interval	Sig *p* < 0.05	Hypothesis	Result
EL→DT→PIP	0.221	[0.061–0.399]	Yes	−0.119	[−0.342; 0.105]	No	H3	Supported
EL→INTRA→PIP	0.014	[−0.098–0.116]	No	−0.119	[−0.342; 0.105]	No	H4	Not Supported
EL→ACAP→PIP	0.312	[0.175–0.462]	Yes	−0.119	[−0.342; 0.105]	No	H5	Supported

5. Discussion and Conclusions

The numerical data analysis reveals that entrepreneurial leadership has a relevant and significant direct relationship with intra-firm networks, design thinking, DT, and absorptive capacity. These results allow us to claim that we can accept the hypotheses (H2a, H2b, and H2c).On the other hand, we encountered an interesting finding: entrepreneurial leadership's direct relationship to product innovation performanceis insignificant (H1). The above-mentioned findings, i.e., entrepreneurial leadership's influence on the adoptive capacity, intra-firm networks, and design thinking, are in line with the previous literature and they emphasize that entrepreneurial leadership can enhance intra-firm collaboration, design thinking, and the absorptive capacity of the firm significantly [39,41,48,69]. However, the fact that the results revealed that entrepreneurial leadership does not directly influence the product innovation performance was a little surprising, because the literature highlighted the fact that EL is all about creating a conducive and suitable climate for the innovation to take place [35]. There is a strong connection between innovation performance and entrepreneurship; however, entrepreneurship is a context-dependent social process, which tries to bring together diverse resources to explore and exploit opportunities under the umbrella and direction of leadership. So, we suggest that further research should be conducted in different contexts to better understand the reason for this behavior [70]. Mediation analysis revealed that entrepreneurial leadership is working as a context-dependent phenomenon influencing product innovation performance through the tools of design thinking (H3) and absorptive capacity ACAP (H5), instead of having a direct influence. However, it does not have a significant influence on PIP through INTRA (H4), which means that INTRA is not mediating between EL and PIP. This result is surprising and against the findings of previous studies [47] and further research is needed to find out the reasons behind it.

5.1. Theoretical Implication

The present study has proposed and empirically tested a functional mechanism of entrepreneurial leadership comprising of design thinking, intra-firm networks, and absorptive capacity, through which entrepreneurial leadership affects a product innovation performance that requires minimum financial commitment and resources for execution, hence contributing to the theory of entrepreneurial leadership by proposing a new functional mechanism. Furthermore, the present study contributed to the theory of entrepreneurial leadership by synergizing it with the theory of design thinking by suggesting the use of design thinking tools and practices for the pro-active problem-solving characteristics of entrepreneurial leadership.

Moreover, most of the previous literature has studied product innovation performance from the perspective of the R&D budget and other financial perspectives requiring a huge financial commitment. Improving the innovation performance through these perspectives is difficult for firms in developing countries as they lack the required financial and managerial resources. This study, however, chosea different path and studied product innovation performance from the perspectives of entrepreneurial leadership, design thinking, and networking that do not require a huge financial commitment. Moreover, most of the previous studies have discussed the relationship between entrepreneurship, leadership, and product innovation performance separately. However, the literature regarding the combined impact of entrepreneurship and leadership (in the form of entrepreneurial leadership) on the product innovation performance is scarce, and the present study has made a significant contribution in this regard.

5.2. Managerial Implications

This study highlighted a very important point that entrepreneurial leadership has a very important role in innovation performance as established by many previous studies. However, as per the findings of this study, entrepreneurial leadership needs a mechanism to improve the product innovation performance of the firm. Therefore, managers must keep

this in mind; entrepreneurial leader characteristics alone arenot enough. A whole mechanism and set of tools such as design thinking, intra-firm networks, and absorptive capacity are required to improve the product innovation performance. Managers further need to understand that entrepreneurial leadership is very important for design thinking, intra-firm networks, and absorptive capacity. In other words, the presence of entrepreneurial leadership acts as a catalyst for design thinking, intra-firm networks, and absorptive capacity so that they can all work in conjunction for a better product innovation performance.

Management also has to understand that they have to create and promote an environment where employees are encouraged to act as entrepreneurial leaders; they must be encouraged to think out of the box and pro-actively. The main task of entrepreneurial leaders is to make their organization ambidextrous, which means that entrepreneurial leaders are always looking to explore and exploit opportunities and in the process, they tend to take risks and make mistakes. Furthermore, management has to encourage formal and in-formal intra-firm networking between employees for a better and quicker sharing of ideas and information and for quicker idea sharing and innovation.

5.3. Limitation and Future Research

The study has used a cross-sectional research design; however, all the variables used in this study are very dynamic and can change quickly over a short passage of time depending upon the circumstances. Therefore, to further validate the findings of this research, longitudinal research may be conducted, and its results may be compared with this study for better understanding. Moreover, the sample size is satisfactorily large; however, a further study is recommended with a larger sample size from a wider sample set of cities to further validate the results.

References

1. Schumpeter, J.A.; Nichol, A. Robinson's economics of imperfect competition. *J. Political Econ.* **1934**, *42*, 249–259. [CrossRef]
2. Gault, F. The Oslo Manual. In *Handbook of Innovation Indicators and Measurement*; Edward Elgar Publishing: Cheltenham, UK, 2013.
3. Aslam, F.; Maitlo, Q. Entrepreneurial leadership and innovation: The mediating role ofemployee voice behavior. *J. Innov. Sustain. RISUS* **2019**, *10*, 123–129. [CrossRef]

4. Fontana, A.; Musa, S. The impact of entrepreneurial leadership on innovation management and its measurement validation. *Int. J. Innov. Sci.* **2017**, *9*, 2–19. [CrossRef]

5. Pisapia, J.; Feit, K. Entrepreneurial Leadership at a Crossroads. In *DIEM: Dubrovnik International Economic Meeting*; Sveučilište u: Dubrovniku, Croatia, 2015.

6. Chryssochoidis, G.M. Factors affecting product innovations: A literature review. *Agric. Econ. Rev.* **2003**, *4*, 47–62.

7. Fincher, M. Impact of Shortening International Product Life Cycle. In *Proceedings of the 1996 Multicultural Marketing Conference*; Springer: Cham, Switzerland, 2015.

8. Liu, W.; Atuahene-Gima, K. Enhancing product innovation performance in a dysfunctional competitive environment: The roles of competitive strategies and market-based assets. *Ind. Mark. Manag.* **2018**, *73*, 7–20. [CrossRef]

9. Curado, C.; Muñoz-Pascual, L.; Galende, J. Antecedents to innovation performance in SMEs: A mixed methods approach. *J. Bus. Res.* **2018**, *89*, 206–215. [CrossRef]

10. Muñoz-Pascual, L.; Curado, C.; Galende, J. The triple bottom line on sustainable product innovation performance in SMEs: A mixed methods approach. *Sustainability* **2019**, *11*, 1689. [CrossRef]

11. Gupta, S.; Malhotra, N. Marketing innovation: A resource-based view of international and local firms. *Mark. Intell. Plan.* **2013**, *31*, 111–126. [CrossRef]

12. Antonakis, J.; Autio, E. Entrepreneurship and Leadership. In *The Psychology of Entrepreneurship*; Psychology Press: London, UK, 2014; pp. 221–240.

13. Thornberry, N. *Lead Like an Entrepreneur*; McGraw Hill Professional: Fairfield, PA, USA, 2006.

14. Leitch, C.M.; Volery, T. Entrepreneurial leadership: Insights and directions. *Int. SmallBus. J.* **2017**, *35*, 147–156. [CrossRef]

15. Gupta, V.; MacMillan, I.C.; Surie, G. Entrepreneurial leadership: Developing and measuring a cross-cultural construct. *J. Bus. Ventur.* **2004**, *19*, 241–260. [CrossRef]

16. Esmer, Y.; Faruk, D. Entrepreneurial leadership: A theoretical framework. *Mehmet Akif Ersoy Üniversitesi İktisadi İdari Bilimler Fakültesi Derg.* **2017**, *4*, 112–124. [CrossRef]

17. Lopez-Acevedo, G.; Medvedev, D.; Palmade, V. *South Asia's Turn: Policies to Boost Competitiveness and Create the Next Export Powerhouse*; World Bank: Washington, DC, USA, 2016.

18. Simon, H. *The Sciences of the Artificial*; MIT Press: Cambridge, USA, 1996; Volume 33, No. 5.

19. Aslam, F.; Aimin, W.; Li, M.; Ur Rehman, K. Innovation in the era of IoT and industry 5.0: Absolute innovation management (AIM) framework. *Information* **2020**, *11*, 124. [CrossRef]

20. Brown, T.; Martin, R. Design for Action. *Harv. Bus. Rev.* **2015**, *93*, 57–64. [CrossRef]

21. Dunne, D.; Martin, R. Design thinking and how it will change management education: An interview and discussion. *Acad. Manag. Learn. Educ.* **2006**, *5*, 512–523. [CrossRef]

22. Brenner, W.; Uebernickel, F. Design Thinking for Innovation. In *Research and Practice*; Springer: Cham, Switzerland, 2016.

23. Najafi-Tavani, S.; Najafi-Tavani, Z.; Naudè, P.; Oghazi, P.; Zeynaloo, E. How collaborative innovation networks affect new product performance: Product innovation capability, process innovation capability, and absorptive capacity. *Ind. Mark. Manag.* **2018**, *73*, 193–205. [CrossRef]

24. Khoja, F.; Maranville, S. The power of intrafirm networks. *Acad. Strateg. Manag. J.* **2013**, *12*, 405–424.

25. Achrol, R.S.; Kotler, P. Marketing in the network economy. *J.Mark.* **1999**, *63*, 146–163. [CrossRef]

26. Edvardsson, B.; Jaakkola, E.; Sebastiani, R.; Witell, L. The impact of intra-and interfirm collaboration on service innovation in B2B firms. In Proceedings of the 30th IMP-Conference, Bordeaux, France, 1–16 September 2014; Available online: https://www.impgroup.org/uploads/papers/8187.pdf (accessed on 22 May 2021).

27. Goossen, M.C. Intraorganizational Networks, Interorganizational Collaboration and Firm Innovation. Ph.D. Thesis, HEC, Paris, France, 2014.

28. Lichtenthaler, U. Absorptive capacity, environmental turbulence, and the complementarity of organizational learning processes. *Acad. Manag. J.* **2009**, *52*, 822–846. [CrossRef]

29. Zahra, S.A.; George, G. Absorptive capacity: A review, reconceptualization, and extension. *Acad. Manag. Rev.* **2002**, *27*, 185–203. [CrossRef]

30. Oparaocha, G.O. Towards building internal social network architecture that drives innovation: A social exchange theory perspective. *J. Knowl. Manag.* **2016**, *20*, 534–556. [CrossRef]

31. Swiercz, P.M.; Lydon, S.R. Entrepreneurial leadership in high-tech firms: A field study. *Leadersh. Organ. Dev. J.* **2002**, *23*, 380–389. [CrossRef]

32. Al Mamun, A.; Ibrahim, M.D.; Yusoff, M.N.H.B.; Fazal, S.A. Entrepreneurial leadership, performance, and sustainability of micro-enterprises in Malaysia. *Sustainability* **2018**, *10*, 1591. [CrossRef]

33. Indawati, N.; Witjaksono, A.D.; Kistyanto, A. The Impact of Entrepreneurial Leadership and Innovation Process on Innovation Performance. *Int. J. Acad. Res. Bus. Soc. Sci.* **2018**, *8*, 573–593. [CrossRef]

34. Bull, I.; Willard, G.E. Towards a theory of entrepreneurship. *J. Bus. Ventur.* **1993**, *8*, 183–195. [CrossRef]

35. Roomi, M.A.; Harrison, P. Entrepreneurial leadership: What is it and how should it be taught? *Int. Rev. Entrep.* **2011**, *9*, 1–44.

36. Leitch, C.M.; McMullan, C.; Harrison, R.T. The development of entrepreneurial leadership: The role of human, social and institutional capital. *Br. J. Manag.* **2013**, *24*, 347–366. [CrossRef]

37. Renko, M.; El Tarabishy, A.; Carsrud, A.L.; Brännback, M. Understanding and measuring entrepreneurial leadership style. *J. Small Bus. Manag.* **2015**, *53*, 54–74. [CrossRef]
38. Brown, T.; Katz, B. *Change by Design: How Design Thinking Tansforms Organizations and Inspires Innovation*; Harper Business: New York, NY, USA, 2019; Volume 20091.
39. Bagheri, A.; Pihie, Z.A.L. Entrepreneurial leadership: Towards a model for learning and development. *Hum. Resour. Dev. Int.* **2011**, *14*, 447–463. [CrossRef]
40. Ferreras Mendez, J.L.; Sanz Valle, R.; Alegre, J. Transformational leadership and absorptive capacity: An analysis of the organisational catalysts for this relationship. *Technol. Anal. Strateg. Manag.* **2018**, *30*, 211–226. [CrossRef]
41. Musa, S. Measuring Entrepreneurial Leadership in Innovation Management—An Exploratory Analysis. In *ISPIM Innovation Symposium*; The International Society for Professional Innovation Management (ISPIM): Oslo, Norway, 2014.
42. Liñán, F.; Fayolle, A. A systematic literature review on entrepreneurial intentions: Citation, thematic analyses, and research agenda. *Int. Entrep. Manag. J.* **2015**, *11*, 907–933. [CrossRef]
43. Garbuio, M.; Dong, A.; Lin, N.; Tschang, T.; Lovallo, D. Demystifying the genius of entrepreneurship: How design cognition can help create the next generation of entrepreneurs. *Acad. Manag. Learn. Educ.* **2018**, *17*, 41–61. [CrossRef]
44. Von Kortzfleisch, H.F.; Zerwas, D.; Mokanis, I. Potentials of entrepreneurial design thinking®for entrepreneurship education. *Procedia Soc. Behav. Sci.* **2013**, *106*, 2080–2092. [CrossRef]
45. Daniel, A.D. Fostering an entrepreneurial mindset by using a design thinking approach in entrepreneurship education. *Ind. High. Educ.* **2016**, *30*, 215–223. [CrossRef]
46. Yenicioglu, B.; Suerdem, A. Participatory new product development—A framework for deliberately collaborative and continuous innovation design. *Procedia Soc. Behav. Sci.* **2015**, *195*, 1443–1452. [CrossRef]
47. Stam, W.; Elfring, T. Entrepreneurial orientation and new venture performance: The moderating role of intra-and extraindustry social capital. *Acad. Manag. J.* **2008**, *51*, 97–111. [CrossRef]
48. Ramachandran, K.; Ramnarayan, S. Entrepreneurial orientation and networking: Some Indian evidence. *J. Bus. Ventur.* **1993**, *8*, 513–524. [CrossRef]
49. Sanz-Valle, R.; Jiménez-Jiménez, D. HRM and product innovation: Does innovative work behaviour mediate that relationship? *Manag. Decis.* **2018**, *56*, 1417–1429. [CrossRef]
50. Bowling, A. Mode of questionnaire administration can have serious effects on data quality. *J. Public Health* **2005**, *27*, 281–291. [CrossRef]
51. Bullough, A.; Renko, M.; Myatt, T. Danger zone entrepreneurs: The importance of resilience and self–Efficacy for entrepreneurial intentions. *Entrep. Theory Pract.* **2014**, *38*, 473–499. [CrossRef]
52. Schleimer, S.C.; Faems, D. Connecting interfirm and intrafirm collaboration in NPD projects: Does innovation context matter? *J. Prod. Innov. Manag.* **2016**, *33*, 154–165. [CrossRef]
53. Blizzard, J.; Klotz, L.; Potvin, G.; Hazari, Z.; Cribbs, J.; Godwin, A. Using survey questions to identify and learn more about those who exhibit design thinking traits. *Des. Stud.* **2015**, *38*, 92–110. [CrossRef]
54. Engelman, R.M.; Fracasso, E.M.; Schmidt, S.; Zen, A.C. Intellectual capital, absorptive capacity and product innovation. *Manag. Decis.* **2017**, *55*, 474–490. [CrossRef]
55. Krasikova, D.V.; LeBreton, J.M. Multilevel Measurement: Agreement, Reliability, and Nonindependence. In *The Handbook of Multilevel Theory, Measurement, and Analysis*; American Psychological Association: Washington, DC, USA, 2019; pp. 279–304.
56. Hair, J.F.; Risher, J.J.; Sarstedt, M.; Ringle, C.M. When to use and how to report the results of PLS-SEM. *Eur. Bus. Rev.* **2019**, *31*, 2–24. [CrossRef]
57. Hair, J.F., Jr.; Hult, G.T.M.; Ringle, C.; Sarstedt, M. *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*; Sage Publications: Newbury Park, CA, USA, 2016.
58. Cronbach, L.J.; Meehl, P.E. Construct validity in psychological tests. *Psychol. Bull.* **1955**, *52*, 281. [CrossRef]
59. Ab Hamid, M.; Sami, W.; Sidek, M.M. Discriminant Validity Assessment: Use of Fornell & Larcker Criterion versus HTMT Criterion. *J. Phys. Conf. Ser.* **2017**, *890*, 012163.
60. Henseler, J.; Ringle, C.M.; Sarstedt, M. A new criterion for assessing discriminant validity in variance-based structural equation modeling. *J. Acad. Mark. Sci.* **2015**, *43*, 115–135. [CrossRef]
61. Hair, J.; Hollingsworth, C.L.; Randolph, A.B.; Chong, A.Y.L. An updated and expanded assessment of PLS-SEM in information systems research. *Ind. Manag. Data Syst.* **2017**, *117*, 442–458. [CrossRef]
62. Hair, J.F.; Ringle, C.M.; Sarstedt, M. PLS-SEM: Indeed a Silver Bullet. *J. Mark. Theory Pract.* **2011**, *19*, 139–152. [CrossRef]
63. Chin, W.W. The partial least squares approach to structural equation modeling. *Mod. Methods Bus. Res.* **1998**, *295*, 295–336.
64. Wong, K. *Mastering Partial Least Squares Structural Equation Modeling (PLS-SEM) with Smartpls in 38 Hours*; IUniverse: Bloomington, IN, USA, 2019.
65. Stone, M. Cross-validatory choice and assessment of statistical predictions. *J. R. Stat. Soc. Ser. B Methodol.* **1974**, *36*, 111–133. [CrossRef]
66. Sarstedt, M.; Hair, J.F., Jr.; Cheah, J.-H.; Becker, J.-M.; Ringle, C.M. How to specify, estimate, and validate higher-order constructs in PLS-SEM. *Australas. Mark. J. AMJ* **2019**, *27*, 197–211. [CrossRef]
67. Shmueli, G.; Sarstedt, M.; Hair, J.F.; Cheah, J.-H.; Ting, H.; Vaithilingam, S.; Ringle, C.M. Predictive model assessment in PLS-SEM: Guidelines for using PLSpredict. *Eur. J. Mark.* **2019**, *53*, 2322–2347. [CrossRef]

68.	Sobel, M.E. Asymptotic confidence intervals for indirect effects in structural equation models. *Sociol. Methodol.* **1982**, *13*, 290–312. [CrossRef]
69.	Fernald, L.W.; Solomon, G.T.; Tarabishy, A. A new paradigm: Entrepreneurial leadership. *South. Bus. Rev.* **2005**, *30*, 1–10.
70.	Ling, Y.H.; Jaw, B.S. Entrepreneurial leadership, human capital management, and global competitiveness. *J. Chin. Hum. Resour. Manag.* **2011**, *2*, 117–135. [CrossRef]