

Presenting a Model of the Role of Entrepreneurial Leadership in the Performance of Active Small and Medium Businesses in the Field of Nanotechnology in Tehran

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Purpose: Entrepreneurial leadership plays an effective role in improving the performance of various businesses including small and medium businesses. As a result, the current research was conducted with the aim of presenting a model of the role of entrepreneurial leadership in the performance of active small and medium businesses in the field of nanotechnology in Tehran.

Methodology: The method of this research was of mixed exploratory type (qualitative and quantitative). The population of the present study in the qualitative section was the policy experts of the nanotechnology industry, which number of 17 of them were selected as a sample according to the principle of theoretical saturation and with the purposeful sampling method. Also, the population of present study in the quantitative section was the managers and experts of small and medium businesses of nanotechnology industry with number 1434 people, which 303 people of them were selected as a sample according to Cochran's formula and with the available sampling method. The data of the qualitative and quantitative sections were collected with methods of semi-structured interview and researcher-made questionnaires, respectively which whose psychometric indicators were confirmed and analyzed with methods of thematic analysis in MAXQDA software and exploratory factor analysis and structural equation modeling in SPSS and LISREL software, respectively.

Findings: The findings of the first part of current research showed that the model of the role of entrepreneurial leadership in the performance of active small and medium businesses in the field of nanotechnology had 13 sub-factors in the 5 main factors of guidance, support, coaching, facilitation and entrepreneurship. Also, the findings of the second part of the present study showed that the factor load, average variance extracted and reliability of all factors were appropriate. In addition, the model of the role of entrepreneurial leadership in the performance of small and medium-sized businesses active in the field of nanotechnology had a significant effect on all five main factors and each factor with its sub-factors ($P < 0.05$). Also, the findings of the second part of the current research showed that the factor load, average variance extracted and reliability of all factors were appropriate. In addition, the model of the role of entrepreneurial leadership in the performance of active small and medium businesses in the field of nanotechnology had a significant effect on all five main factors and each main factor on its sub-factors ($P < 0.05$).

Conclusion: The model of the role of entrepreneurial leadership in the performance of active small and medium businesses in the field of nanotechnology has many practical implications for the activists in the field of nanotechnology industry, and they can according to the identified factors provide the basis for improving entrepreneurial leadership.

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Introduction

The constant changes in today's business environment necessitate that organizations move towards innovation. These organizations must participate in various types of innovative activities to increase their competitive advantages and ensure their long-term survival (Bahmani, Ghamkhari, & Dinarvand, 2022). Nowadays, small and medium-sized enterprises (SMEs), due to their unique and deserving characteristics in creating employment, play a significant role in the economies of countries. However, the important issue is how an individual can utilize existing resources and opportunities for job creation (Liu, Chen, & Ko, 2024). SMEs have always been scrutinized by various experts in the economies of countries, and the findings indicate that these businesses are of significant importance due to their immense impact on the national economy and their rapid adaptation to the changes and transformations of today's volatile market (Hamplova & Provaznikova, 2015). Organizations with small and medium-sized businesses experiencing growth also face challenges such as the need for quick decision-making by managers, expanding job needs and expectations, the need for recruitment and training of new people, ongoing changes in the organization, and resource limitations (Nikolaeva & Pletnev, 2016). Therefore, businesses in today's world are in a challenging and constantly changing environment, and despite market opportunities for new business ideas, sufficient resources, and talented employees, they can still experience failure (Zuzaku & Abazi, 2022). Entrepreneurs are influential individuals in the business world who discover, evaluate, and exploit opportunities that others overlook. Thus, entrepreneurs play a significant role in various aspects of today's businesses (Ma, Cheok, & Chok, 2023).

The development of countries today is based on entrepreneurship, effective leadership, creativity, and innovation. This matter has gained special importance due to the phenomenon of globalization, and organizations are forced to be always ready for entrepreneurship by their leaders to survive in the highly competitive and unstable economic environment (Wahab & Tyasari, 2020). In the present era, entrepreneurship is the main driver of the economy and a factor for competition and improvement in the quality of organizations. In this context, managing entrepreneurial teams and the execution and commercialization of entrepreneurial ideas are of special importance. The process of implementing entrepreneurial ideas includes assembling the execution team, financing, making decisions, and introducing new products and services to customers (Su, Liang, & Wen, 2023). The entrepreneur plays an effective role in economic growth and development, increasing competition, creating jobs, developing equity, reducing poverty, increasing national income, and solving the problems of society, government, and the public sector (Abdulsalehi, Saffarian Hamedani, & Salehi, 2022). The success of entrepreneurs in their businesses depends on their impact on others, and successful entrepreneurs possess two characteristics: opportunity recognition and influencing others, where influencing aligns with a fundamental concept, namely leadership. Therefore, leadership and entrepreneurship are in direct interaction with each other (Lechner, Sortheix, Obschonka, & Salmela-Aro, 2018). Entrepreneurial leadership is a potential approach that can influence innovative behavior, and many researchers have emphasized the importance of leadership as a key factor in the field of innovative behavior (Abdelwahed, Soomro, & Shah, 2023). Leadership is a process in which one individual influences and directs others to achieve a common goal. Thus, a leader is someone who thinks and acts creatively in unusual situations to influence the feelings, activities, and beliefs of others. Entrepreneurship is a set of activities and actions taken by individuals at different levels to gain a competitive advantage through recognizing and pursuing opportunities (Ruvio, Rosenblatt, & Hertz-Lazarowitz, 2010). Entrepreneurial leadership is a new paradigm created from the combination of leadership and entrepreneurship, meaning a type of leadership that has the ability to identify and exploit existing opportunities in the entrepreneurial environment (Dabic, Stojcic, Simic, Potocan, Slavkovic, & Nedelko, 2021). Entrepreneurial leadership is defined as organizing a group of people to achieve a common goal through entrepreneurial behaviors operationalized by risk-taking, innovation, opportunity recognition, and change management in a dynamic environment (Mishra & Misra, 2017). This type of leadership, by defining a vision and strategic alliance and creating motivation and commitment in employees, builds the necessary capabilities for discovering and

exploiting opportunities through encouraging innovation and creative use of human and social capital and other organizational resources, ultimately facilitating the realization of entrepreneurship in the organization (Xia, Liu, Wang, Deng, Han, Liu, & Tsai, 2023).

Entrepreneurial leadership, by creating high levels of trust and engagement in the organization in relation to managerial responsibilities, leads to increased innovation and strengthens and expands administrative reforms and management practices in the organization. These leaders, relying on inspirational characteristics, motivate individuals with great ideas and guide them in turning this shared vision into reality, playing a significant role in discovering and developing entrepreneurial opportunities (Vrespo, Crespo, & Curado, 2023). This type of leadership has gained significant importance among experts and planners due to the dynamic nature of the business environment and the challenges facing entrepreneurs and managers (Stephan & Pathak, 2016). In this leadership style, the leader emphasizes the group's performance in achieving organizational goals, which includes recognizing and exploiting entrepreneurial opportunities, and such leaders have the ability to establish communication between different perspectives to engage teams in identifying, developing, and using opportunities, creating value for the organization, and guiding group performance to achieve organizational goals through recognizing and discovering opportunities (Reid, Anglin, Baur, Short, & Buckley, 2018). Entrepreneurial leadership is a type of leadership that increases high levels of trust and engagement in the organization in relation to managerial responsibilities and creativity, leading to the strengthening and expansion of administrative reforms and management practices in the new system (Strobl, Bauer, & Matzler, 2020). Entrepreneurial leaders can gather different individuals and create an environment for the creation of ideas and support for businesses, especially new and innovative businesses (Humphries, Kaplan, & Alves, 2016). Entrepreneurial leaders understand their operational domain and this understanding goes beyond their business, including various situations with different degrees of complexity. Such individuals understand their own behavior and that of others and can develop their own abilities and those of their followers (Newman, Tse, Schwarz, & Nielsen, 2018). This type of leadership not only leads to an increase in followers' motivation to generate creative ideas in response to the opportunities they face in their work but also encourages the utilization of ideas in innovative behaviors (Sarabi, Froese, Chng, & Meyer, 2020).

Few studies have been conducted on the role of entrepreneurial leadership in the performance of small and medium-sized enterprises (SMEs), and no exploratory mixed-methods research has been found in this area. Davar, Safariyan Hamedani, and Zameni (2021), in a study titled "Presenting an Entrepreneurial Leadership Model Based on a Qualitative Theoretical Grounded Theory Approach," concluded that it identified 72 concepts, 13 subcategories, and 5 main categories including guidance (goal orientation, inspiration, and modeling), facilitation (cognitive ability, communicative ability, and empowerment), support (creating commitment, motivation, and emotional intelligence), coaching (team orientation and participation), and entrepreneurial factor (professional capability and entrepreneurial capability). Eshghi, Sarrafizadeh Qazvini, Alam Tabriz, and ZandHessani (2021), in a study titled "Identifying Trait-based and Skill-based Components of Entrepreneurial Leadership: A Meta-Synthesis Study," concluded that this construct consisted of 69 primary codes, 13 concepts, and 6 categories including characteristics of entrepreneurial leaders (with two concepts of specific traits and traits shared with entrepreneurs), human skills (with two concepts of communicative skill and motivational skill), leadership skills (with two concepts of knowledge of leadership style and general leader behaviors), entrepreneurial skills (with two concepts of mental skills and practical skills), business management skills (with two concepts of managing subordinates and managing the organization), and cognitive skills (with three concepts of analytical skills, knowledge skills, and strategic skills). Nor-Aishah, Ahmad, and Thurasamy (2021), in a study titled "Entrepreneurial Leadership and Sustainable Performance of Small and Medium Manufacturing Companies in Malaysia: The Potential Role of Entrepreneurial Bricolage," concluded that entrepreneurial leadership had significant effects on the sustainable environmental and social performance of small and medium manufacturing companies, but it did not have a significant impact on their sustainable economic performance. Al Mamun, Dahlan Ibrahim, Bin

Yusof, and Fazal (2018), in a study titled "Entrepreneurial Leadership, Performance, and Sustainability of Micro-Enterprises in Malaysia," concluded that entrepreneurial leadership through aspects of responsibility, accountability, and emotional intelligence had significant impacts on the performance and sustainability of micro-enterprises.

In the current situation of Iran, experts introduce entrepreneurship development as the best way to create employment and solve unemployment problems (Taheri, Alemtabriz, Samiei, & Samari, 2022). Also, regarding the importance and necessity of the current research, it can be said that in many countries, the importance and value of new and innovative technologies in various aspects of life have been well understood, and for this reason, they have started familiarity with these technologies with a regular curriculum from the primary level. One of these technologies is nanotechnology, which can provide new opportunities for scientific and economic growth in any society. One of the effective leadership styles in this field is entrepreneurial leadership, which can play an effective role in the scientific and economic growth of any industry. Furthermore, entrepreneurial leadership plays an effective role in improving the performance of various businesses, including SMEs. Therefore, the current research was conducted with the aim of presenting a model of the role of entrepreneurial leadership in the performance of SMEs active in the field of nanotechnology in Tehran. Thus, the present research seeks to answer the question of what factors entrepreneurial leadership has in the performance of SMEs active in the field of nanotechnology in Tehran and what model can be drawn for it?

Methodology

The research method was of a mixed exploratory (qualitative and quantitative) type. The study population in the qualitative part consisted of policy experts in the nanotechnology industry, of whom 17 were selected as the sample according to the principle of theoretical saturation and through purposive sampling. In addition, the study population in the quantitative part consisted of 1434 managers and experts of small and medium-sized enterprises (SMEs) in the nanotechnology industry, from which 303 individuals were selected as the sample according to Cochran's formula and through convenience sampling. In the qualitative part, among all identified policy experts in the nanotechnology industry who met the entry criteria for the study, including agreement to record the interview, having sufficient knowledge in the research area, willingness to participate in the study, and having experience in the research field, 17 people were selected as the sample. In this part of the research, sampling and research on them continued until new samples could not add any new findings to the previous ones. Similarly, in the quantitative part, 303 individuals from all managers and experts of SMEs in the nanotechnology industry were selected through convenience sampling based on their willingness to participate in the research and responded to the researcher-made questionnaire in this part.

The research process began by designing interview questions for the qualitative sample, i.e., policy experts in the nanotechnology industry, with the help of professors. Then, these samples were selected based on the entry criteria for the study and underwent semi-structured interviews; the sampling process in this section and interviews with them continued until the research reached saturation. Based on the findings from the qualitative part, a questionnaire was designed, and managers and experts of SMEs in the nanotechnology industry, i.e., the quantitative samples, were asked to respond to it. It was explained to them that there were no right or wrong answers, and the best response was the one that reflected their actual situation. The objectives, importance, and necessity of the research were explained to the samples from both qualitative and quantitative parts, and they were assured and committed to ethical standards. Additionally, at the end of the interview with each of the experts from the qualitative sample and at the end of completing the researcher-made questionnaire by the quantitative samples, appreciation and thanks were given.

In this research, data from the qualitative and quantitative parts were collected using semi-structured interviews and researcher-made questionnaires, respectively. The semi-structured interview question was designed with the help of professors and included five main questions and several sub-questions, such that all five main questions were asked of all qualitative samples, and sub-questions were asked only of those samples

that needed further explanation about the main question or went beyond the scope of the question while responding. The duration of the interview with each of the experts lasted between 40 to 55 minutes. At the end of each interview, the findings were analyzed using thematic analysis, and this process continued until the research reached saturation. The validity of the interviews was confirmed through triangulation, and their reliability was achieved with an agreement coefficient between two coders of 0.77. The questionnaire was designed by the researchers of the present study based on the results of the semi-structured interviews. A five-point Likert scale was used to answer the questionnaire questions, ranging from strongly disagree with a score of one, disagree with a score of two, neutral with a score of three, agree with a score of four, and strongly agree with a score of five. The validity and reliability of the researcher-made questionnaire are observable in the findings section.

The data from the qualitative and quantitative parts were analyzed using thematic analysis in MAXQDA software, exploratory factor analysis, and structural equation modeling in SPSS and LISREL software, respectively.

Findings

The findings of the first part of the present research, i.e., the qualitative part, were obtained through thematic analysis. Therefore, the main and subsidiary factors affecting the model of the role of entrepreneurial leadership in the performance of SMEs active in the nanotechnology field are visible in Table 1.

Table 1. Thematic analysis of the main and subsidiary factors affecting the model of the role of entrepreneurial leadership in the performance of small and medium-sized enterprises active in the field of nanotechnology

Main Factors	Sub-factors
Guidance	Goal orientation
	Inspiration
	Modeling
Support	Motivation creation
	Commitment creation
	Emotional intelligence
Coaching	Team orientation
	Participation
Facilitation	Cognitive ability
	Communicative ability
Entrepreneurship	Empowerment
	Professional capability
	Entrepreneurial capability

As observed in Table 1, the model of the role of entrepreneurial leadership in the performance of SMEs active in the nanotechnology field consisted of 13 subsidiary factors across 5 main factors: guidance, support, coaching, facilitation, and entrepreneurship.

The findings of the second part of the present research, i.e., the quantitative part, were obtained through exploratory factor analysis and structural equation modeling. Therefore, the exploratory factor analysis of the main and subsidiary factors affecting the model of the role of entrepreneurial leadership in the performance of SMEs active in the nanotechnology field is visible in Table 2.

Table 2. Exploratory factor analysis of the main and subsidiary factors affecting the model of the role of entrepreneurial leadership in the performance of small and medium-sized enterprises active in the field of nanotechnology

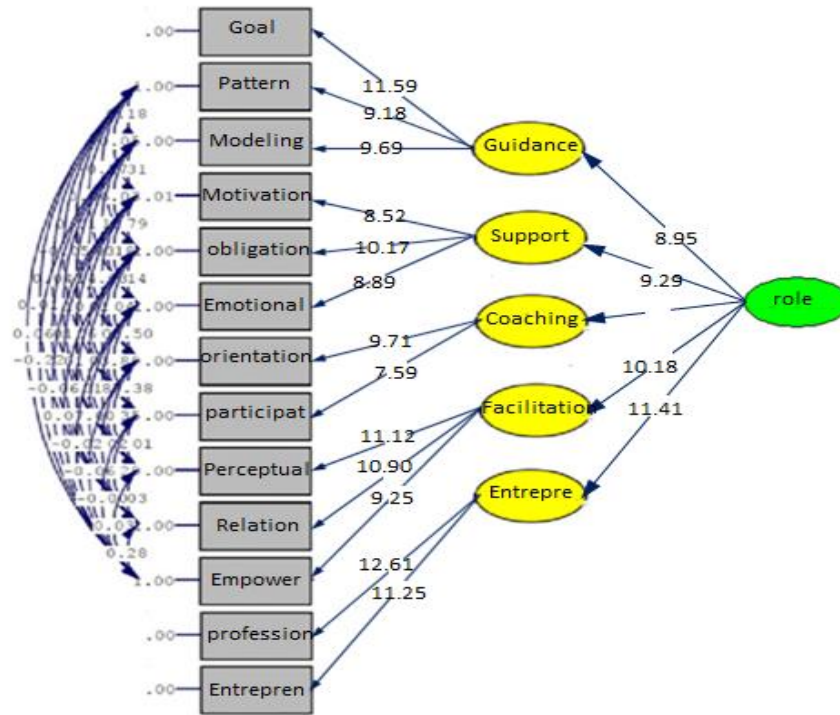
Main Factors	Sub-factors	Factor Loadings	AVE	Cronbach's Alpha
Guidance	3 factors	0.53	0.63	0.76
	Goal orientation	0.48	0.59	0.72
	Inspiration	0.56	0.55	0.79
	Modeling	0.42	0.64	0.81
Support	3 factors	0.73	0.72	0.86
	Motivation creation	0.58	0.59	0.79
	Commitment creation	0.49	0.68	0.84
	Emotional intelligence	0.61	0.61	0.79
Coaching	2 factors	0.50	0.56	0.88
	Team orientation	0.67	0.51	0.76
	Participation	0.49	0.73	0.74
Facilitation	3 factors	0.52	0.59	0.89
	Cognitive ability	0.68	0.62	0.87
	Communicative ability	0.63	0.57	0.85
	Empowerment	0.59	0.72	0.91
Entrepreneurship	2 factors	0.46	0.76	0.89
	Professional capability	0.42	0.56	0.76
	Entrepreneurial capability	0.66	0.60	0.71

As observed in Table 2, the factor loadings, the average extracted variance, and the reliability of all the main and subsidiary factors affecting the model of the role of entrepreneurial leadership in the performance of SMEs active in the nanotechnology field were appropriate due to being above 0.40, 0.50, and 0.70, respectively. The goodness of fit of the model of the role of entrepreneurial leadership in the performance of SMEs active in the nanotechnology field is visible in Table 3.

Table 3. Goodness of fit of the model of the role of entrepreneurial leadership in the performance of small and medium-sized enterprises active in the field of nanotechnology

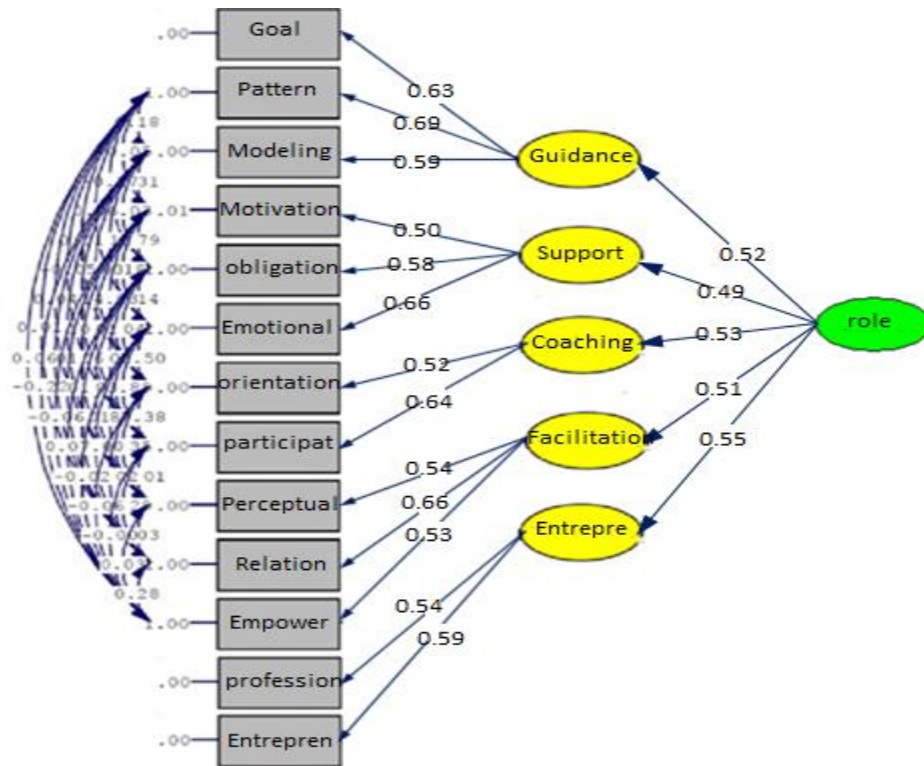
Index	Value	Acceptable fit	Result
GFI	0.92	>0.90	Approved
AGFI	0.93	>0.90	Approved
CFI	0.94	$0.90 < x < 1.00$	Approved
RMSEA	0.06	<0.08	Approved

As observed in Table 3, the model of the role of entrepreneurial leadership in the performance of SMEs active in the nanotechnology field had an acceptable and suitable fit. The model of the role of entrepreneurial leadership in the performance of SMEs active in the nanotechnology field, in terms of T-value and path coefficient, is visible in Figures 1 and 2, and its effects are observable in Table 4.



Chi-Square=43.33, df=24, P-value=0.00911, RMSEA=0.065

Figure 1. The model of the role of entrepreneurial leadership in the performance of small and medium-sized enterprises active in the field of nanotechnology in the state of T-value



Chi-Square=43.33, df=24, P-value=0.00911, RMSEA=0.065

Figure 2. The model of the role of entrepreneurial leadership in the performance of small and medium-sized enterprises active in the field of nanotechnology in the state of path coefficient

Table 4. Effects of the model of the role of entrepreneurial leadership in the performance of small and medium-sized enterprises active in the field of nanotechnology

Effects	Beta	t	p	Result
The effect of the entrepreneurial leadership role model on guidance	52.0	95.8	000.0	Approved
The effect of the entrepreneurial leadership role model on support	49.0	29.9	001.0	Approved
The effect of the entrepreneurial leadership role model on coaching	53.0	70.8	000.0	Approved
The effect of the entrepreneurial leadership role model on facilitation	51.0	18.10	000.0	Approved
The effect of the entrepreneurial leadership role model on entrepreneurship	55.0	41.11	000.0	Approved
The effect of guidance on goal orientation	63.0	59.11	000.0	Approved
The effect of guidance on inspiration	69.0	18.9	001.0	Approved
The effect of guidance on modeling	59.0	69.9	001.0	Approved
The effect of support on motivation creation	50.0	52.8	001.0	Approved
The effect of support on commitment creation	58.0	17.10	002.0	Approved
The effect of support on emotional intelligence	66.0	89.8	003.0	Approved
The effect of coaching on team orientation	52.0	71.9	000.0	Approved
The effect of coaching on participation	64.0	59.7	002.0	Approved
The effect of facilitation on cognitive ability	54.0	12.11	000.0	Approved
The effect of facilitation on communicative ability	66.0	90.10	001.0	Approved
The effect of facilitation on empowerment	53.0	25.9	000.0	Approved
The effect of entrepreneurship on professional capability	54.0	61.12	000.0	Approved
The effect of entrepreneurship on entrepreneurial capability	59.0	25.11	002.0	Approved

As seen in Figures 1 and 2 and Table 4, the model of the role of entrepreneurial leadership in the performance of SMEs active in the nanotechnology field had a significant impact on all five main factors, and each main factor significantly influenced its subsidiary factors ($P < 0.05$).

Conclusion

Given the growing information and trends in entrepreneurship and the increased level of governmental support for entrepreneurial activities, conducting further research in this area, particularly on entrepreneurial leadership, seems necessary. Leadership in entrepreneurship, knowledge management within the company and organization, and creating a suitable environment for the emergence of organizational creativity are among the new challenges of leadership in the age of entrepreneurship. Moreover, as entrepreneurial leadership plays an effective role in improving the situation of companies and organizations, and since little research has been conducted on entrepreneurial leadership in the performance of small and medium-sized enterprises (SMEs) active in the nanotechnology field, researchers felt a significant gap in this area. As a result, the current study was conducted with the aim of presenting a model of the role of entrepreneurial leadership in the performance of SMEs active in the nanotechnology field.

Since this study was qualitative and quantitative, its findings were reported separately for both parts. The findings of the first part of the current research showed that the model of the role of entrepreneurial leadership in the performance of SMEs active in the nanotechnology field consisted of thirteen subsidiary factors across five main factors: guidance, support, coaching, facilitation, and entrepreneurship. Furthermore, the findings

of the second part of the current research indicated that the factor loadings, the average variance extracted, and the reliability of all factors were appropriate. In addition to that, the model of the role of entrepreneurial leadership in the performance of SMEs active in the nanotechnology field had a significant impact on all five main factors and each main factor significantly influenced its subsidiary factors. As mentioned above, little research has been done on entrepreneurial leadership in the performance of small and medium-sized businesses and none on entrepreneurial leadership in the performance of SMEs active in the nanotechnology field, but the mentioned findings can be aligned with the findings of researchers such as Davar et al. (2021), Eshghi et al. (2021), Nor-Aishah et al. (2021), and Al Mamun et al. (2018) in some respects.

In interpreting and explaining the findings of this study, it can be stated that guidance consisted of three subsidiary factors: goal orientation, inspiration, and modeling. Therefore, entrepreneurial leadership, through goal orientation, inspiration, and modeling, fulfills the responsibility of guiding the company and organization. Entrepreneurial leaders, with foresight and vision, act transparently in defining and communicating vision, mission, and objectives, and strive to achieve them with proper planning. These leaders, by defining organizational values and striving for their institutionalization in the organization and enhancing positivity and optimism, and creating intimate relationships within the organization, inspire and always strive to be a practical model for their words. Support consisted of three subsidiary factors: motivation creation, commitment creation, and emotional intelligence. Therefore, entrepreneurial leaders must first have high motivation and commitment themselves, and based on that, increase the commitment level of other employees and provide them with sufficient motivation to achieve organizational goals. They can use various types of intrinsic and extrinsic motivations for this purpose. Without a doubt, having high emotional intelligence can be very effective for support. This intelligence even helps entrepreneurial leaders to accept criticism and suggestions from employees openly and also causes other employees to perceive entrepreneurial leaders as a colleague, not as a boss or superior. These leaders, instead of punishing, blaming, and reproaching for mistakes and errors of employees, use forgiveness, forbearance, and offer them proposed solutions to prevent mistakes and errors. Moreover, coaching consisted of two subsidiary factors: team orientation and participation. Therefore, entrepreneurial leaders use participatory and team decision-making for making important organizational and company decisions and distribute various activities for achieving organizational goals among organization members so that each employee considers themselves an important part of the organization and company. Undoubtedly, greater participation of employees in decisions and organizational activities, realized by entrepreneurial leadership, creates a competitive advantage for the organization. Facilitation consisted of three subsidiary factors: cognitive ability, communicative ability, and empowerment. Therefore, among the cognitive abilities required for entrepreneurial leadership are industry recognition including technology, product, market, customer, and the correct perception of interests, attitudes, and concerns of employees, and these leaders with strategic understanding of internal and external organizational factors act to identify and predict factors and contexts of organizational change and transformation. These leaders, in addition to high perception, must have high communication capability and ability to use them properly to strengthen close social relationships and feelings of friendship among employees and establish effective and constructive human relationships, creating a suitable environment in the organization for the emergence of entrepreneurship. Another important point is the empowerment of organizational employees by entrepreneurial leaders, and these leaders should always have regular and systematic programs for the growth and promotion of their employees. In addition to that, entrepreneurship consisted of two subsidiary factors: professional capability and entrepreneurial capability. Therefore, entrepreneurial leaders should have both high professional and job capability and entrepreneurial capability in the organization. As a result, entrepreneurial leaders must act before other employees to achieve the entrepreneurial goals of the organization, and these leaders, relying on their professional capability including expertise, competence, and scientific and experimental qualifications, should prepare and provide the ground for achieving the mentioned goals.

Given the results of this study, the model of the role of entrepreneurial leadership in the performance of SMEs active in the nanotechnology field has many practical implications for those active in the nanotechnology industry field, and they can prepare the ground for improving entrepreneurial leadership based on the identified factors. It is worth mentioning that companies in the nanotechnology field should act step by step and gradually according to a roadmap and long-term strategic plan to implement these factors and proceed to develop an operational plan for its implementation.

Ethical Considerations

It is worth mentioning that the objectives, importance, and necessity of the research were explained to the samples from both qualitative and quantitative parts, and they were assured and committed to ethical standards.

Acknowledgments

At the end of the interview with each of the experts from the qualitative sample and at the end of completing the researcher-made questionnaire by the quantitative samples, appreciation and thanks were given.

Authors' Contributions

The authors of the present research collaborated in all stages of the research.

Conflict of Interest

There was no conflict of interest among the authors in this study.

References

- Abdelwahed NAA, Soomro BA, Shah N. (2023). Predicting employee performance through transactional leadership and entrepreneur's passion among the employees of Pakistan. *Asia Pacific Management Review*. 28(1): 60-68. doi: [10.1016/j.apmr.2022.03.001](https://doi.org/10.1016/j.apmr.2022.03.001)
- Abdulsalehi A, Saffarian Hamedani S, Salehi M. (2022). Entrepreneurial education in Islamic Azad University in order to provide a model. *Iranian Journal of Educational Sociology*. 5(3): 270-283. doi: [10.61186/ijes.5.3.280](https://doi.org/10.61186/ijes.5.3.280)
- Al Mamun A, Dahlan Ibrahim M, Bin Yusof MNH, Fazal SA. (2018). Entrepreneurial leadership, performance, and sustainability of micro-enterprises in Malaysia. *Sustainability*. 10(1591): 1-23. doi.org/[10.3390/su10051591](https://doi.org/10.3390/su10051591)
- Bahmani A, Ghamkhari SM, Dinarvand GhH. (2022). The effect of talent management strategies on innovation performance with mediating role of entrepreneurial tendency and moderating entrepreneurial leadership in knowledge-based companies. *Journal of Innovation Management in Defensive Organization*. 4(14): 143-162. doi: [10.22034/qjindo.2022.277052.1406](https://doi.org/10.22034/qjindo.2022.277052.1406)
- Crespo CF, Crespo NF, Curado C. (2022). The effects of subsidiary's leadership and entrepreneurship on international marketing knowledge transfer and new product development. *International Business Review*. 31(2): 101928. doi: [10.1016/j.ibusrev.2021.101928](https://doi.org/10.1016/j.ibusrev.2021.101928)
- Dabic M, Stojcic N, Simic M, Potocan V, Slavkovic M, Nedelko Z. (2021). Intellectual agility and innovation in micro and small businesses: The mediating role of entrepreneurial leadership. *Journal of Business Research*. 123: 683-695. doi: [10.1016/j.jbusres.2020.10.013](https://doi.org/10.1016/j.jbusres.2020.10.013)
- Davar T, Safariyan Hamedani S, Zameni F. (2021). Presenting the entrepreneurial leadership model based on the qualitative approach of grounded theory. *Public Organizations Management*. 9(2): 105-120. [Persian] doi: [10.30473/IPOM.2020.56196.4260](https://doi.org/10.30473/IPOM.2020.56196.4260)
- Eshghi N, Sarrafzadeh Qazvini A, Alam Tabriz A, ZandHessani H. (2021). Identifying trait-based and skill-based components of entrepreneurial leadership: A meta-synthesis study. *Jundishapur Education Development Journal*. 12(3): 799-810. doi: [10.1016/S2212-5671\(15\)00438-4](https://doi.org/10.1016/S2212-5671(15)00438-4)
- Hamplova E, Provaznikova K. (2015). Opinion and attitudes of entrepreneurs of small and medium-sized business in the Czech Republic conditions. *Procedia Economics and Finance*. 23: 942-947. doi: [10.1016/S2212-5671\(15\)00438-4](https://doi.org/10.1016/S2212-5671(15)00438-4)

- Humphries B, Kaplan R, Alves M. (2016). The role of entrepreneurial leadership and innovation in the future of therapeutic dermatology. *Journal of Investigative Dermatology*. 136(12): 2330-2333. doi: 10.1016/j.jid.2016.09.029
- Lechner C, Sortheix FM, Obschonka M, Salmela-Aro K. (2018). What drives future business leaders? How work values and gender shape young adults' entrepreneurial and leadership aspirations. *Journal of Vocational Behavior*. 107: 57-70. doi: 10.1016/j.jvb.2018.03.004
- Liu G, Chen Y, Ko WW. (2024). The influence of marketing exploitation and exploration on business-to-business small and medium-sized enterprises' pioneering orientation. *Industrial Marketing Management*. 117: 131-147. doi: 10.1016/j.indmarman.2023.12.012
- Ma C, Cheok MY, Chok NV. (2023). Economic recovery through multisector management resources in small and medium businesses in China. *Resources Policy*. 80: 103181. doi: 10.1016/j.resourpol.2022.103181
- Mishra P, Misra RK. (2017). Entrepreneurial leadership and organizational effectiveness: A comparative study of executives and non-executives. *Procedia Computer Science*. 122: 71-78. doi: 10.1016/j.procs.2017.11.343
- Newman A, Tse HHM, Schwarz G, Nielsen I. (2018). The effects of employees' creative self-efficacy on innovative behavior: The role of entrepreneurial leadership. *Journal of Business Research*. 89: 1-9. doi: 10.1016/j.jbusres.2018.04.001
- Nikolaeva E, Pletnev D. (2016). The role of the transaction costs in the business success of small and medium sized enterprises in Russia. *Procedia – Social and Behavioral Sciences*. 221: 176-184. doi: 10.1016/j.sbspro.2016.05.104
- Nor-Aishah H, Ahmad NH, Thurasamy R. (2020). Entrepreneurial leadership and sustainable performance of manufacturing SMEs in Malaysia: The contingent role of entrepreneurial bricolage. *Sustainability*. 12(3100): 1-21. doi.org/10.3390/su12083100
- Reid SW, Anglin AH, Baur JE, Short JC, Buckley MR. (2018). Blazing new trails or opportunity lost? Evaluating research at the intersection of leadership and entrepreneurship. *The Leadership Quarterly*. 29(1): 150-164. doi: 10.1016/j.leaqua.2017.11.005
- Ruvio A, Rosenblatt Z, Hertz-Lazarowitz R. (2010). Entrepreneurial leadership vision in nonprofit vs. for-profit organizations. *The Leadership Quarterly*. 21(1): 144-158. doi: 10.1016/j.leaqua.2009.10.011
- Sarabi A, Froese FJ, Chng DHM, Meyer KE. (2020). Entrepreneurial leadership and MNE subsidiary performance: The moderating role of subsidiary context. *International Business Review*. 29(3): 101672. doi: 10.1016/j.ibusrev.2020.101672
- Stephan U, Pathak S. (2016). Beyond cultural values? Cultural leadership ideals and entrepreneurship. *Journal of Business Venturing*. 31(5): 505-523. doi: 10.1016/j.jbusvent.2016.07.003
- Strobl A, Bauer F, Matzler K. (2020). The impact of industry-wide and target market environmental hostility on entrepreneurial leadership in mergers and acquisitions. *Journal of World Business*. 55(2): 100931. doi: 10.1016/j.jwb.2018.03.002
- Su H, Liang Y, Wen T. (2023). Structural embeddedness, entrepreneurial behavior, and firm performance in the industry network of small tourism enterprises: The moderating role of relational embeddedness and leadership self-efficacy. *Journal of Hospitality and Tourism Management*. 56: 431-442. doi: 10.1016/j.jhtm.2023.06.007
- Taheri O, Alemtabriz A, Samiei R, Samari D. (2022). Providing a home business model with a focus on entrepreneurial knowledge (grounded theory approach). *Iranian Journal of Educational Sociology*. 5(3): 27-40. doi: 10.61186/ijes.5.3.27
- Wahab A, Tyasari I. (2020). Entrepreneurial leadership for university leaders: A futuristic approach for Pakistani HEIs. *Asia Pacific Management Review*. 25(1): 54-63. doi: 10.1016/j.apmrv.2019.09.002
- Xia Y, Liu X, Wang X, Deng H, Han C, Liu Z, Tsai SB. (2023). The power of role models in a team: The impact of lead entrepreneur's digital leadership on digital entrepreneurial success. *Information Processing & Management*. 60(6): 103498. doi: 10.1016/j.ipm.2023.103498
- Zuzaku A, Abazi B. (2022). Digital transformation in the western balkans as an opportunity for managing innovation in small and medium businesses - Challenges and opportunities. *IFAC-PapersOnLine*. 55(39): 60-65. doi: 10.1016/j.ifacol.2022.12.011