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Driving innovation from within: the role of a supportive workplace in fostering managerial innovation in Turkey's export-oriented machinery sector

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Driving innovation from within: the role of a supportive workplace in fostering managerial innovation in Turkey's export-oriented machinery sector

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Abstract: Innovation enables businesses to stay ahead of their competitors by offering unique and superior products, services, or processes. It allows companies to differentiate themselves and attract customers, ultimately leading to a competitive advantage in the market. This research investigates the impact of management innovation and a supportive innovative workplace climate on middle-level managers' innovative behaviour by considering the mediating role of strategic innovation orientation. A cross-sectional survey was conducted with 300 middle-level managers working in companies within the machinery industry. The research findings indicate that management innovation and the supportive innovative workplace climate enhance the strategic innovation orientation, which in turn improves middle-level managers' innovative behaviours. These findings hold substantial importance for organisations seeking to enhance their innovative capabilities, create a more engaging and

productive work environment, and gain a competitive edge in the market. Moreover, these results provide valuable guidance for future research and can inform strategic decision-making at both organisational and policy levels.

Keywords: middle-level managers; innovative behaviours; innovative workplace climate; machinery industry; Turkey.

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1 Introduction

In the ever-evolving landscape of business, closely monitoring technological advancements, making new inventions, and effectively implementing technology within the company's structure are essential for progress and development (Schot and

Steinmueller, 2018; Tajeddini, 2010; Tajeddini and Trueman, 2016). Failure to embrace innovation can lead to the disappearance of firms from the market, making it a crucial effort for those striving to improve themselves (Khalil, 2000; Afshar Jahanshahi et al., 2020a; Tajeddini, 2011). Innovation encompasses the creation or development of new and more effective processes, services, products, and technologies, along with their successful adoption and utilisation (Kahn, 2018; Ratten and Tajeddini, 2017). Moreover, innovation plays a pivotal role in driving economic growth, social development, and enhancing business competitiveness (Rajapathirana and Hui, 2018; Tajeddini et al., 2006), leading to beneficial changes in innovation, competitiveness, efficiency, effectiveness, and market access for businesses (Tajeddini and Trueman, 2008).

For profit-oriented and problem-solving companies, innovation is the key to success, enabling them to capitalise on market opportunities through products resulting from rigorous research and development (R&D) activities (Schot and Steinmueller, 2018). This success in innovation transcends technical changes to encompass socio-economic transformations. The concept of management innovation involves creating an environment conducive to organisational innovation and encouraging employees to utilise their creative abilities through various management mechanisms (Khosravi et al., 2019). Factors such as taking risks on behalf of employees, supporting timely production of new solutions, fostering effective teamwork, empowering experts and team leaders to mentor others, and enhancing information exchange within the organisation contribute to a creative organisational climate (Noviyanti et al., 2021).

Organisational innovation, often referred to as the Kaizen (continuous improvement) approach, originated in Japanese companies like Komatsu and Toyota and later spread to other countries (Sendo, 2018). In this approach, all employees in the enterprise have the right to improve processes related to their work, and they actively contribute improvement ideas. These ideas are then presented to managers for evaluation, and the accepted ones are implemented. Through this method, many leading global enterprises, especially Japanese firms, have excelled by producing at the lowest cost and highest quality.

In the competitive business world, strategic thinking alone is insufficient. Companies must not only establish strategic ideas but also make informed choices, plan, implement, analyse results, and adapt their strategies based on ongoing evaluations of the business environment (Dzwigol, 2020). Strategy involves determining adaptable goals, planning processes, and realigning necessary resources and tools while consistently evaluating the company's environment to provide direction and gain a competitive advantage.

Within the realm of strategic management, companies follow roadmaps, actions, and plans to realise their goals and ideals (Makadok et al., 2018). This necessitates going beyond simply having a strategy and striving for a competitive advantage to achieve desired objectives. Innovative behaviour starts with problem definition, continues with generating new ideas and identifying solutions, and culminates in transforming ideas into concrete models through various stages (Bani-Melhem et al., 2018). At the individual level, innovation commences with enabling employees to generate creative ideas (Liu et al., 2019a), and individuals' innovative behaviours vary based on factors like personal structure and cultural characteristics.

Our research contributed to the current innovation literature in several ways (Afshar Jahanshahi, 2019; Jahanshahi et al., 2019; Jahanshahi and Zhang, 2015; Polas et al., 2023; Tajeddini et al., 2006; Tajeddini and Tajeddini, 2012). First, our research confirms and extends the existing literature by demonstrating that management innovation plays a

pivotal role in fostering innovative behaviour among middle-level managers. This finding reinforces the importance of innovative management practices in driving organisational innovation. Second, the study's results provide empirical evidence of the positive influence of a supportive innovative workplace climate on innovative behaviour. This contribution adds to the literature on the significance of creating a work environment that encourages and nurtures innovation. Third, by identifying the mediating role of strategic innovation orientation in the relationship between management innovation, workplace climate, and innovative behaviour, our research offers valuable insights. This finding highlights the need for organisations to develop a strategic orientation toward innovation, which, in turn, influences managers' behaviour. Finally, our research findings hold practical significance for organisations looking to enhance their innovative capabilities. They underscore the importance of implementing management innovation, cultivating an innovative workplace culture, and promoting strategic innovation orientation to drive innovation within the company.

Finally, some practical implications and actionable steps that organisations can consider based on the research findings to enhance innovation and workplace climate: Firstly, organisations should prioritise the development and implementation of innovative management practices. This may involve re-evaluating existing managerial processes, encouraging new leadership styles, and embracing innovative approaches to decision-making. By fostering a culture of management innovation, companies can enhance their overall innovative capabilities. Secondly, companies can create a work environment that promotes and sustains innovation. This can be achieved by encouraging open communication, idea sharing, and a sense of psychological safety where employees feel comfortable proposing new concepts and approaches. Training programs and workshops focused on creativity and innovation can also be beneficial. Lastly, organisations should actively work on cultivating a strategic innovation orientation among their managers and employees. This involves aligning innovation efforts with the company's broader strategic goals and objectives. Companies can set up clear innovation strategies, allocate resources to innovation projects, and create a structured approach to innovation management.

2 Literature review

2.1 Management innovation

Management innovation is the development and utilisation of new organisational structures, strategies, or processes that bring about changes in administrative systems and rules within an organisation (Damanpour and Aravind, 2012). According to Khosravi et al. (2019), management innovations encompass novel approaches to creating strategies, processes, and structures that transform the way managers and members of the organisation operate. Roehrich et al. (2019) consider management innovation as the pursuit of doing something new and different from the current state, with a particular focus on the art of management.

Specifically, management innovation involves altering administrative systems, encompassing practices and approaches that motivate and reward organisational members, improve the strategic organisation of tasks and units, and change the management policies of the organisation (Zhang et al., 2019). It is crucial to note that

strategic changes made in response to market or economic conditions should not be mistaken for management innovation. True management innovation entails shifts in management practices, processes, consciousness, and the culture of influence that impacts self-managing teams within the organisation (Vaccaro et al., 2012).

In the realm of gaining and maintaining competitive advantage, management innovation ranks at the top when considering a hierarchy typology of innovation types (Hamel and Breen, 2007). Hamel and Breen (2007) also emphasise the necessity for managerial progress to be revolutionary rather than cumulative, asserting that innovation should originate from the top and can positively influence other types of innovation. Moreover, management innovation is closely related to shaping employee behaviour in alignment with management goals (Guzman and Espejo, 2019). Its primary purpose is to make decisions that bring about behavioural changes in the organisation, motivate efforts, and operate management functions cohesively (Huang et al., 2021).

2.2 Organisational innovative climate

Organisational innovation is the company's openness to organisational change and the adaptation of new practices in the business. It is the use of a new organisational method in business transactions, workplace arrangement or dealing with the environment. Organisational innovation can be predicted to increase firm success by reducing administrative and transaction costs, increasing workplace satisfaction, or reducing hardware costs (Liu et al., 2019b). From this perspective, innovation is not only goods and processes but also a fertile ground within a firm's organisational structures, administrative processes, and management practices (Ibrahim et al., 2018). Organisational innovation includes applications related to the organisation, such as new or developed information technologies, organisational arrangements, improvement of business processes and can have personal, organisational or environmental effects (Hsu et al., 2018). Organisational innovation defines a goal-oriented, continuous feature of a company that is found in all business units and is based on specific company characteristics (Kim et al., 2021). This type of innovation occurs in situations where making changes in the organisational structure, applying advanced management techniques and organisational structures, and applying different innovation strategies are needed (Luo et al., 2018). Indeed, a new management system related to the organisation, a new product, service, production technology, production process or a new marketing idea may be related to organisational innovation (Ramirez et al., 2018). When look at the most innovative companies in the world in the research conducted by the bostan advisory group on this subject, it can be seen that technology-oriented companies are in the majority in the list (Figure 1). This situation shows how important management innovation is in terms of R&D activities.

Organisational innovation is the adaptation of an idea or behaviour that is new to the organisation: a new product, service, process, technology or a management practice to the organisation. In organisational innovations, the organisation focuses on issues such as the existing capacities of internal dynamics and organisational parameters that are shaped and changed in line with demands, and interdisciplinary solidarity and flexibility in the culture of practice come to the fore as an important factor in the success of organisational innovations (Damanpour, 1991). Since the product and process innovations that constitute technological innovations are directly related to the basic business activities of the enterprise, they generally include changes in the operating systems of the enterprise.

Organisational innovations, on the other hand, include changes in the management systems of the enterprise, as they are indirectly related to the basic business activities of the enterprise. As a result of research on organisational innovation climate, the effects of organisational innovation climate on strategic innovation orientation and individual innovative behaviour are examined within the scope of the research model.

Figure 1 The 50 most innovative companies (see online version for colours)



Source: BCG Most Innovative Companies (MIC) Report 2022

2.3 Strategic innovation orientation

Strategic innovation is to pioneer the realisation of the current work with an effective and different method and is handled at a very limited level compared to other innovation dimensions. Strategic innovation is defined as the ability to manage the ambitious goals of the organisation, creatively controlling the limited resources by detecting the mismatch between these goals and the existing resources (Varadarajan, 2018). Strategic innovation processes: having an organisational mission and vision, being open to different views and thoughts, being exploratory, adding value to knowledge, future orientation, creativity, market orientation, providing new opportunities and creating new value, creating a new business model, being collaborative, and being extroverted (Talke et al., 2011). Strategic orientation is the philosophy that shows the efforts of companies to reach high-level performance and how to do business with a set of beliefs and values (Adams et al., 2019). These values and beliefs explain the resources to be used, transcend individual abilities, and combine abilities and resources as a whole. As such capabilities are interaction-based and intangible and difficult to trade, reproduce, and imitate, they often constitute sources of competitive advantage (Hunt and Morgan, 1995). Moghaddam (2022) explained strategic orientation as behavioural actions that will enable firms to find opportunities and avoid threats by providing internal integrity and external adaptation. Hitt et al. (1997), on the other hand, considered strategic orientation as a reflection of the mental and belief models of senior management. In addition, strategic direction is defined as a special

approach that companies implement in order to demonstrate continuous and superior performance.

Strategic orientation reflects the perceptions of the company's administrative staff and their reactions to environmental conditions. For example, the way to effectively implement strategic direction is to achieve high-level performance in the firm and improve firm capabilities by making it a culture in the firm to gather information about consumers' needs, competitors' capabilities, and intermediary institutions (Puspita et al., 2020). Strategic innovation orientation is a company philosophy about how innovation will be directed in the light of the values and beliefs that shape the innovation practices of companies (Zaman et al., 2020). It is a very important concept in terms of providing a sustainable competitive advantage for companies, and as a result of research on strategic innovation orientation, the effects of strategic innovation orientation on individual innovative behaviour, both as a mediator and as an independent variable, are examined within the scope of the research model.

2.4 Individual innovative behaviour

Individual innovativeness is a person's willingness to innovate and make a difference by behaviourally reacting positively to innovations (Fan et al., 2016). Individual innovation can be defined as developing, accepting, or implementing an innovation (Yuan and Woodman, 2010). Individual innovativeness, which is also accepted as a behavioural value in some studies and in the context of the individual's adoption of innovation in others, is considered a personality trait (Daniel and Chatelain-Jardon, 2015). An individual's innovative behaviour is an effective effort to achieve, through different and result-oriented approaches, and exhibit results while enduring stressful events that require a lot of effort (Yang et al., 2016). Another perspective defines it as the purposeful creation and application of new and practical ideas in the workplace (Montani et al., 2012). Innovative behaviour, an employee's conscious adoption of new ideas about products and processes, is defined as the application to its own business or part of the entire enterprise (Yu et al., 2013). Individuals with innovative features play a serious role in the innovation process, not only with the ideas they put forward but also with their leadership in practice. The transformation of individual talents into innovative behaviours is an important point for both parties. It is of great importance for the organisation to use the talents of the individual bravely and willingly in producing new products, processes, and services. The individual's avoidance of risk as a behaviour for fear of losing his position and advantages means that he is resistant to change (Mutonyi et al., 2020).

It is clear that the individuals in the opinion leadership behaviour dimension have the ability to influence or change the attitudes and behaviours of other individuals in the way they want, reflecting the features that make them stand out from other individuals in the group they are interested in. Opinion leader individuals show examples of behaviour that tolerate mistakes, are constantly learning, have an autonomous personality, and are cooperative and adaptable to change. Individuals in the behavioural dimension of openness to experience have characteristics that reflect their willingness to seek and try innovation. Finally, risk-taking is the other dimension of individual innovative behaviours (McLean, 2005), and these individuals have the characteristics to believe that uncertainties do not prevent them from taking risks (Hitt et al., 2005). It is related to the individual's reaction to the innovation, to feel an idea as an innovation. In other words,

individuals who are the focal point of innovation, are defined as individual innovativeness.

Likewise, Goldsmith and Foxall (2003) mentioned that the act of adoption stands out when it comes to the behavioural dimension of innovation. In addition, when we look at the studies in different fields related to this concept, first of all, Canet-Giner et al. (2020) analysed the effect of employees' perceptions of performance appraisal practices on innovative behaviour in a study they conducted using a sample of 166 employees who carry out high-quality, information-intensive jobs in four industrial companies in the Valencia region of Spain. As a result of their research, they state that performance appraisal practices in the context of professional and qualified work have a direct and positive effect on innovative behaviour. Secondly, Jaroensutiotin et al. (2019) stated that as a result of their research by collecting data from 247 people in 42 companies affected by the 2011 Thailand flood crisis, change leadership has a significant direct and indirect positive effect on individual innovative behaviour and an idea has emerged about how change leadership can facilitate individual innovative behaviour in the context of a crisis. These studies conducted in different fields show that there are effects on individual innovative behaviour in both managerial and organisational terms. As a result of research on individual innovative behaviour, the effects of management innovation, organisational innovative climate, and strategic innovation orientation on individual innovative behaviour are examined within the scope of the research model.

3 Hypotheses development

A strong innovation product can help the organisation gain a competitive advantage while providing rapid recognition. However, because technological progress provides high imitation, it rarely adds value to the long-term sustainability of this advantage. This can be explained by the fact that iconic products of many global organisations have been wiped out of the market because of another innovative product (Hamel and Breen, 2007). For this reason, management practices are important in terms of revealing the correct problems that will affect all functions of management within the organisation and lead to change. The fact that the organisation has self-managing teams that take initiative is emphasised as an important factor that ensures the realisation of management innovation (Kunz and Linder, 2015). In other words, management innovation is the process of generating innovative solutions to benefit organisations by making a radical or transformative change in management processes, strategies and methods. This process can also affect the individual innovative behaviour of the organisation. For example, an organisation's management may adopt an open communication strategy to be open to employee ideas and create a system for accepting innovative ideas from employees. This can help employees present more innovative ideas and help the organisation develop an innovative culture. As another example, a management team can manage the organisation's projects more efficiently by adopting a new method in the project management process. This method can encourage employees to further improve the process by offering innovative ideas and suggestions. According to this explanation, there may be an assumption that management innovation affects individual innovative behaviour. Today, innovation is a very important element for the success of organisations, their competitiveness, and the economic development of countries and businesses. Organisations operating in ever-changing and developing environments need

to be more creative and innovative- in terms of new products, new processes, new technologies, new uses, etc. (Hsu and Fan, 2010). Organisational innovative climate refers to a work environment where employees are encouraged, encouraged and supported to present, share and implement innovative ideas. In this environment, individual innovative behaviours of employees are likely to increase. At the same time, organisational innovative climate is an important factor affecting strategic innovation orientation. Business managers must support the organisational innovative climate to create an innovative environment. An innovative environment can help business managers develop innovation strategies and embrace innovation in all of their business activities. For this reason, it can be assumed that the organisational innovative climate affects both strategic innovation orientation and individual innovative behaviour. Strategic innovation has been explained as the capacity to catch up with competitors before their preparations are finished and to re-evaluate new ways of generating revenue for stakeholders (Kasemsap, 2017). The management team of strategic innovation needs the ability to think strategically, including both the future and the present, in order to be successful; innovation and effectiveness require different company characteristics, such as finding creative ideas and analytical thinking.

As a result of these explanations in the literature, it is assumed that management innovation and organisational innovation climate have effects on strategic orientation, but it can also be assumed that strategic innovation orientation has an effect on individual innovative behaviour. Innovations do not occur only with technical investments such as R&D activities. Routine innovations of the enterprise are also important for the survival of the enterprise. For this reason, experts, scientists and managers who are aware of this vital role of innovation try to drive the middle-level managers to innovative behaviours (Brown, 2016).

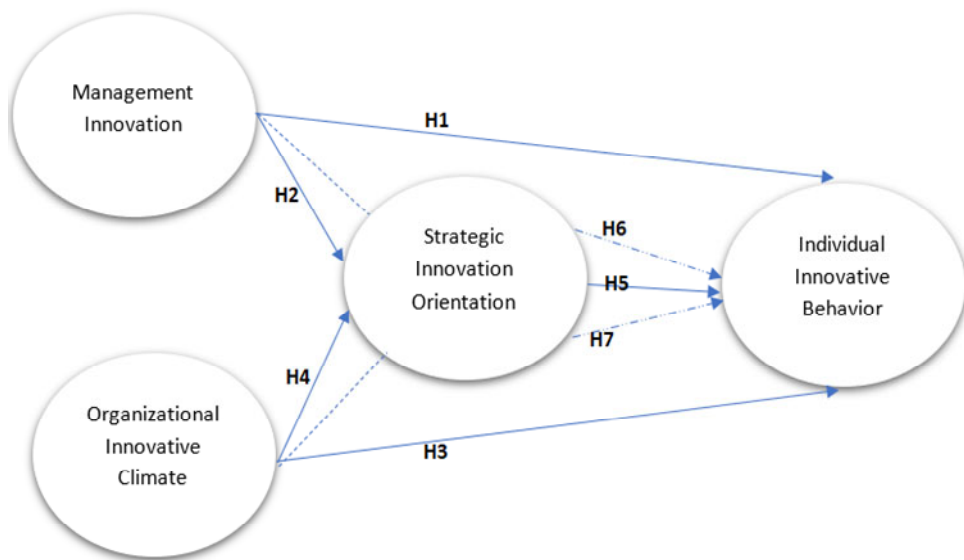
The hypotheses developed in this context:

- H1 In the R&D departments of companies, management innovation has a positive effect on the middle-level managers innovative behaviour.
- H2 In the R&D departments of companies, management innovation has a positive effect on the strategic innovation orientation.
- H3 In the R&D departments of the companies, the supportive organisational innovative climate has a positive effect on the middle-level managers innovative behaviour.
- H4 In the R&D departments of the companies, the supportive organisational innovative climate has a positive effect on the strategic innovation orientation.
- H5 In the R&D departments of the companies, the strategic innovation orientation has a positive effect on the middle-level managers innovative behaviour.
- H6 Strategic innovation orientation has a mediating variable effect between management innovation and the middle-level managers innovative behaviour.
- H7 Strategic innovation orientation has a mediating variable effect between supportive organisational innovative climate and the middle-level managers innovative behaviour.

4 Methodology

For the article, data were collected from companies operating in the machinery sector and had R&D departments in organised industrial zones in Istanbul. Istanbul is one of the most advanced cities in Turkey in terms of industrialisation. There are eight organised industrial zones in Istanbul and according to the 2020 Istanbul Provincial Industry Status Report, 4898 industrial enterprises registered in the Industrial Registry Information System operate in these OIZs. According to the same report, 10.85% of these companies are engaged in machinery and equipment manufacturing. These companies were chosen to examine the importance of middle-level managers innovative activities as a result of the machinery industry in Turkey, particularly those starting to make export-oriented investments. An online questionnaire was chosen as the data collection. After determining the main population, firms and employees to be surveyed were determined by using random sampling method. These questionnaires were sent by e-mail to the target participants, who are authorised engineer experts/middle-level managers. The reason for the selection of authorised engineer specialists/middle-level managers in the R&D-departments is because the research model and questions cover management, strategic, and organisational innovation, and it was deemed appropriate to collect data from authorised engineer specialists/managers. A total of 412 e-mails were sent and the participants were called by phone and informed. Some participants stated that they would not participate due to their work intensity. Since participation in the survey was voluntary, the scale was deemed sufficient to provide sufficient size according to power analyses. Thus, the response rate was approximately 75%. The survey was conducted between April 2021 and October 2021 where 300 questionnaires were returned.

Figure 2 Research model (see online version for colours)



In order to avoid missing data, the questions in the online survey were marked as 'necessary'. Since participation in the survey is on a voluntary basis, unwilling answers were prevented. Since the questions are unnecessarily long and excessive, which will

affect the participants, the scale expressions used in the formation of the statements are presented in both Turkish and English in order to achieve the best explanatory power. The desired participant was able to participate by changing his language preference. Before the scales were included in the analysis, their internal consistency was checked. Since a 300-unit questionnaire was sufficient for 80% power, 0.05 significance level, and four variables, questionnaire answering was stopped. In order not to encounter the common method variance problem, the respondents were given sufficient time, the number of questions was kept low, and anonymity was ensured.

Measurement scales: For the scale of Management innovation, the scale (Cronbach's $\alpha = 0.908$) in the research conducted by Magnier-Watanabe and Benton (2017) was used. For the organisational innovative climate scale, the scale (Cronbach's $\alpha = 0.930$) in the research conducted by Liu and Shi (2009) was used. For the Individual innovative behaviour scale, the scale (Cronbach's $\alpha = 0.900$) in the research conducted by Scott and Bruce (1994) was used. For the Strategic innovation orientation scale, Talke et al. (2011) used the scale (Cronbach's $\alpha = 0.890$) in their research.

Figure 3 Inner model for research

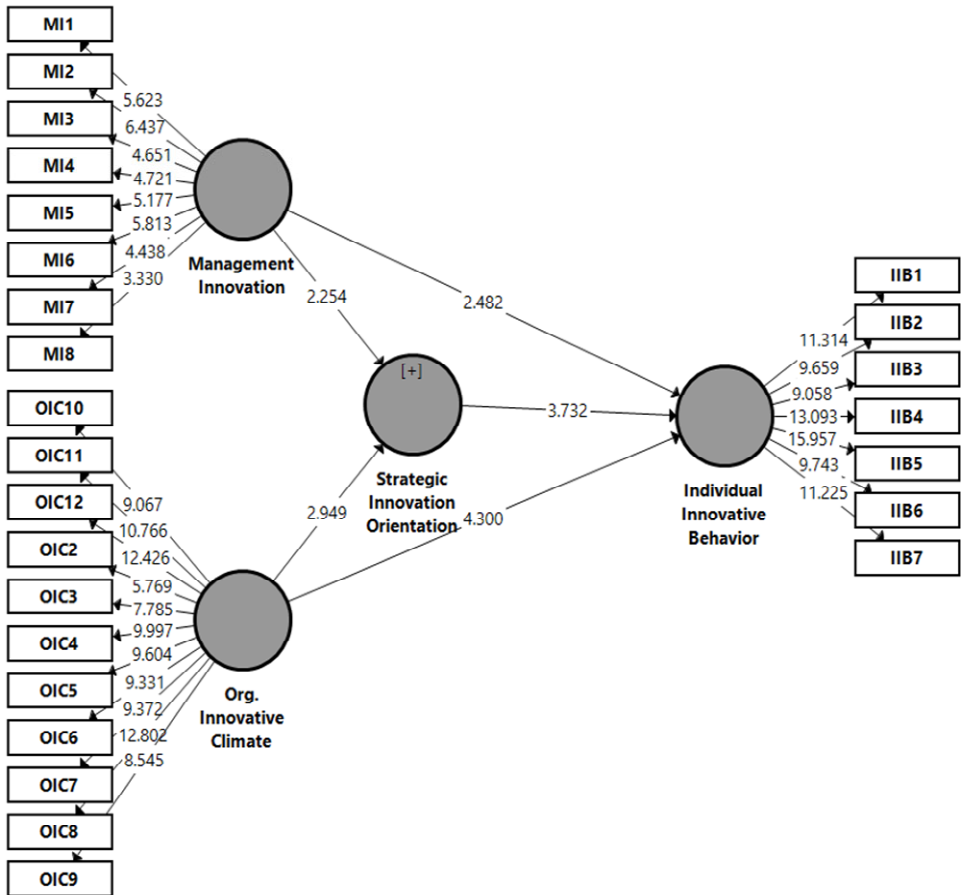


Table 1 Factor analysis results

		Outer loadings	Outer weights	Adjusted R square	Outer loadings t-Stat.	Outer VIF
Individual innovative behaviour	IIB1	0.725	0.193	0.426	9.058*	2.152
	IIB2	0.611	0.163		13.093*	2.041
	IIB3	0.633	0.169		15.957*	1.683
	IIB4	0.756	0.202		9.743*	1.869
	IIB5	0.787	0.210		11.225*	2.131
Management innovation	IIB6	0.689	0.184		5.623*	1.866
	IIB7.	0.739	0.197		6.437*	1.574
	MI1	0.782	0.138		4.651*	4.031
	MI2	0.943	0.184		4.721*	3.529
	MI3	0.844	0.175		5.177*	3.440
	MI4	0.735	0.129		5.813*	3.247
	MI5.	0.811	0.143		4.438*	2.648
	MI6	0.836	0.147		3.330*	3.360
	MI7	0.755	0.133		9.058*	2.385
	MI8	0.639	0.112		13.093*	2.585

Note: *All p value < 0.05.

Table 1 Factor analysis results (continued)

		Outer loadings	Outer weights	Adjusted R square	Outer loadings t-Stat.	Outer VIF
Organisational innovative climate	OIC2	0.616	0.106		5.769*	1,799
	OIC3	0.666	0.115		7.785*	2,398
	OIC4	0.715	0.123		9.997*	2,350
	OIC5	0.720	0.124		9.604*	2,117
	OIC6	0.670	0.116		9.331*	2,078
	OIC7	0.727	0.126		9.372*	1,969
	OIC8	0.756	0.131		12.802*	2,165
	OIC9	0.660	0.114		8.545*	2,323
Strategic innovation orientation	OIC10	0.701	0.121		9.067*	2,108
	OIC11	0.765	0.132		10.766*	2,029
	OIC12	0.802	0.138		12.426*	2,125
	SIO1	0.808	0.318	0.314	12.836*	1,970
	SIO2	0.723	0.285		9.289*	2,250
	SIO3	0.777	0.306		13.007*	1,910
	SIO4	0.752	0.296		10.085*	1,831

Note: *All p value < 0.05.

219 (73%) of the participants were male and 81 (27%) were female. 68 (22.7%) firms operate regionally, 178 (59.3%) firms operate nationally, and 54 (18%) firms operate internationally. 237 (79%) of the participants are undergraduate, 59 (19.7%) graduate and four (1.3%) doctoral graduates.

Reflective for the model? Formative? Confirmatory tetrad analysis was performed to reveal that All CI low and CI up values were compared with each other (–, +) structures were observed and it was observed that there were reflective models in the model. Analyses and comments are given over the reflective model structure.

The research model is given in Figure 2. In this way, dashed lines are used to show mediator effects; solid lines are used to show direct effects between one variable and another. Figure 2 also shows the hypotheses established for the model. Accordingly, five direct effects and two mediation effects were analysed in the model. Management innovation's strategic innovation orientation and individual innovative behaviour were based on the direct positive effects of organisational innovative climate on strategic innovation orientation and individual innovative behaviour, the direct positive effects of strategic innovation orientation on individual innovative behaviour, and the mediating variable effects of strategic innovation orientation, all of which were analysed. Partial least square structural equation modelling was used in the analysis. In this way, the path coefficients between the variables were obtained. SmartPLS 3.3.3 was used to perform the transactions. After the datasets were organised, variable and path definitions were made to the program. Accordingly, the model given in Figure 3 was tested.

In Figure 3, the variables and the expressions that the variables have are given. Management innovation has eight expressions; strategic innovation orientation has four; individual innovative behaviour has seven; and organisational innovative climate has eleven expressions. While the analyses were being made, the explanatory factor analysis result was removed from the analysis, since the expression 1 of the organisational innovative climate variable did not show the appropriate expression load and negatively affected the reliability and validity values. The meanings and explanations of the numerical representations in Figure 3 are given in Table 1.

5 Analyses

The PLS method has significantly fewer assumptions than analyses with models with covariance structures. It provides consistent results as in the analysis of covariance. It also gives consistent results in datasets where the sample size is relatively small. These features make PLS a useful application for hypothesis testing and model analysis. PLS can be used easily if the structures in the model are reflective and formative. Modelling results are given in accordance with both reflective and formative structure. In Table 1, outer loading, outer weight, r square, outer loadings t statistics and outer variance inflation factor (VIF) values are given and interpreted.

Table 1 shows the results of the analysis made in the SmartPLS 3.3.3 package program. When the factorisation results, factor loads, factor weights, reliability and validity values are appropriate, it was decided that the model is suitable and path analysis could be started. Indicator loads should be greater than 0.70 to ensure indicator reliability for the model (Hair et al., 2017). When the outer loading column is examined, it was seen that the smallest load value is 0.611. This value is less than 0.70, but since these values do not adversely affect the reliability and validity values calculated over factor loads,

they were not excluded from the analysis. Whether the measurement model is reflective or formative, factor weights must be absolutely positive. Negative outer weights might be a result of high indicator collinearity (Ringle and Sarstedt, 2016). All outer weights values obtained as a result of the analysis are positive. R square values are coefficients of determination values and represent the explained variance. Indicates how much of the variance a latent variable explains in an endogenous variable. R Square value is required to be greater than 0.26 (Cohen, 2013). The problem of multicollinearity that may arise between indicators is an important problem especially in formative measurement models. In case of high linearity, standard errors will also increase, which will trigger type II error (Cenfetelli and Bassellier, 2009). VIF values of 5 and higher indicate a potential collinearity problem (Hair et al., 2017). All of the VIF values given in Table 1 are below 5. Therefore, it can be easily said that there is no multicollinearity among the expressions in the dataset. Inner VIF values are also below 5. We can see if the outer loadings values are meaningful by interpreting the t statistics values. The fact that these values are greater than the t value of 1.96 at the 5% significance level indicates that there is a significant relationship between the expression and the variable. All of these values are greater than 1.96, and all of the P value values are less than 5%.

Table 2 Construct reliability and validity values

	<i>Number of items</i>	<i>Cronbach's alpha</i>	<i>rho_A</i>	<i>Composite reliability (CR)</i>	<i>Average variance extracted (AVE)</i>
IIB	7	0,876	0,879	0,875	0,501
MI	8	0,949	0,959	0,932	0,636
OIC	11	0,918	0,920	0,918	0,505
SIO	4	0,850	0,851	0,850	0,586

In order to ensure internal consistency reliability in the model, the Cronbach alpha values and composite reliability values should be above 0.70. AVE should be greater than 0.50 meaning that 50% or more variance of the indicators should be accounted for (Chin, 2010). At the same time, all AVE values must be less than their CR values. When these conditions are met, it can be said that the model has construct validity. Construct reliability and validity values are given in Table 2.

Table 3 Fornell-Larcker criterion and heterotrait-monotrait ratio (HTMT) values

	<i>Fornell-Larcker criterion value</i>				<i>Heterotrait-Monotrait ratio</i>		
	<i>IIB</i>	<i>MI</i>	<i>OIC</i>	<i>SIO</i>	<i>IIB</i>	<i>MI</i>	<i>OIC</i>
IIB	<i>0.708</i>						
MI	0.505	<i>0.834</i>			0.503		
OIC	0.552	0.170	<i>0.711</i>		0.550	0.170	
SIO	0.468	0.231	0.293	<i>0.766</i>	0.463	0.227	0.289

AVE of each latent construct should be higher than the construct's highest squared correlation with any other latent construct. According to the Fornell-Larcker criterion, if a variable is compared with itself, the value obtained should be the largest value of the row and column in which it is located. Bold and underlined values among the values given in Table 3. show the values calculated according to the Fornell-Larcker criterion. Values in italics are correlation coefficients. Htmt value is another ratio used in discriminant

validity (Henseler et al., 2009). If this ratio is greater than 0.85 (Clark and Watson, 2016; Kline, 2011) or 0.90 (Gold et al., 2001), it means that discriminant validity has not been achieved. According to the results of the analysis, there is no problem in discriminant validity values or factorisation. After the operations on the model structure, the hypotheses were tested.

Table 4 Path coefficient and confidence intervals value

<i>H</i>	<i>Path</i>	<i>O</i>	<i>M</i>	<i>STDEV</i>	<i>2.5%</i>	<i>97.5%</i>	<i>T</i> <i>Stat.</i>	<i>P</i> <i>values</i>	<i>Decision</i>
H1	MI→IIB	0.160	0.158	0.065	0.035	0.287	2.482	0.013	Accept
H2	MI→SIO	0.186	0.186	0.083	0.032	0.351	2.254	0.025	Accept
H3	OIC→IIB	0.472	0.477	0.110	0.255	0.676	4.300	0.000	Accept
H4	OIC→SIO	0.261	0.268	0.089	0.107	0.440	2.949	0.003	Accept
H5	SIO→IIB	0.367	0.363	0.098	0.165	0.556	3.732	0.000	Accept

Note: O: original sample, M: sample mean.

Table 5 Mediation effect path results

<i>H</i>	<i>Path</i>	<i>O</i>	<i>M</i>	<i>STDEV</i>	<i>2.5%</i>	<i>97.5%</i>	<i>T</i> <i>stat.</i>	<i>P</i> <i>values</i>	<i>Decision</i>
H6	MI→SIO→IIB	0.098	0.095	0.036	0.014	0.145	2.722	0.006	Accept
H7	OIC→SIO→IIB	0.099	0.097	0.042	0.018	0.211	2.357	0.011	Accept

Note: O original sample, M: sample mean.

Path model results are given in Table 4. This model shows whether the established relationships are also supported by the model. The T statistics values of the path coefficient values for each hypothesis are greater than 1.96, the T table value of the 95% confidence level. In addition, the P value of path coefficient values for all hypotheses is less than 0.05, resulting in the conclusion that all hypotheses are supported. That is, all direct effects paths in the model are significant.

Table 6 Mediation effect size value

<i>H</i>	<i>Path</i>	<i>Path coeff.</i> <i>(b)</i>	<i>Path</i> <i>coeff.</i> <i>(c)</i>	<i>Total</i> <i>indirect</i> <i>effect</i>	<i>Total</i> <i>effect</i>	<i>VAF</i>	<i>Mediation</i>
H6	MI→SIO→IIB	0.186	0.367	0.068	0.228	0.30	Partial
H7	OIC→SIO→IIB	0.261	0.367	0.096	0.568	0.17	Non mediation effect

Notes: (b) is the path value between the first hidden variable and the second hidden variable, and (c) is the path coefficient between the second hidden variable and the third hidden variable. When these two coefficients are multiplied, the values seen in the total indirect effect table are obtained. VAF value for H6; $VAF = 0.228/0.568 = 0.30$. If VAF values are below 20%, zero mediator effect is mentioned, while 20%-80% VAF value means partial, and more than 80% means full mediator effect (Hair et al., 2017).

In testing the hypotheses established for the mediation effect, it is necessary to look at the path coefficient values again. Table 5 was created according to the path results obtained from the SmartPLS program. It can be seen that *t* values are greater than 1.96 and all *p* values are less than 0.05. This shows that all effect values are different from 0, that is, they are significant. The paths established for the H6 and H7 hypotheses were also found to be significant. Once these pathways are significant, the mediation effect size needs to be calculated. For this, variance accounted for (VAF) values have been calculated. The VAF value is used to calculate the ratio of the indirect effect to the total effect (Nitzl and Chin, 2017). Mediation effect sizes calculations are given in Table 6.

6 Discussion

Management innovation includes changes in how managers should direct their decisions about what to do, coordinate their activities, and motivate people (Volberda et al., 2013). These changes, thanks to new management practices, processes and structures, as well as new means of change unique to their content, reveal an important source of uncertainty and difficulty to replicate a competitive advantage (Damanpour and Aravind, 2012). Although a firm may withstand these management innovations implemented by other competing firms, what will determine its success is how these management innovations are adapted to the unique structure in its organisation (Ansari et al., 2010).

In comparison of management innovation with other types of innovation, in the current situation, companies have a unique effect in creating permanent and striking differences in gaining more competitive advantage over their competitors. In fact, it may take a few decades for the implemented management innovation practices (innovations) to be noticed by the competitors and to react to these practices. This is particularly the case because it will not be easy for competitor companies – companies, especially to copy the systemic advantages that cover the network of innovations that spread to the management process, which is very numerous (Hamel and Bren, 2007). Heij et al. (2020) state in their research that management innovation has a positive effect on product innovation in companies with low R&D levels and balances negative effects on product innovation at high R&D levels. In this case, it is normal to see the positive effects of management innovation on individual innovative behaviours. Because the sustainability of creative activities in R&D activities is directly proportional to the innovative behaviours of individuals.

If innovations in management principles and processes are not realised, it will be very difficult for individuals to engage in innovative activities in the face of outdated processes. And this situation will gradually begin to decrease due to the lack of progress in management innovation of individual innovative behaviours. The decrease in innovation activities in individual innovative behaviours will leave companies weak in the face of competitors. As a result of the research, the positive effect of management innovation on strategic innovation orientation and individual innovative behaviour supports the explanations made in the literature. These positive effects can be explained as a result of the analyses and as a result of the data collected from companies with R&D departments in organised industrial zones. In addition, it is supported by the hypotheses that management innovation has a positive effect on both strategic innovation orientation and individual innovative behaviour.

In research on the conceptualisation of organisational innovation, it is stated that organisations' openness to new ideas and an organisation's creativity define organisational innovativeness (Calantone et al., 2002). Anzola-Roman et al. (2018) stated that the degree of flexibility of organisations, a company's willingness to change, and an organisation's tendency to do R&D are important for organisational innovation. In another study, it was expressed as a concept consisting of several related factors referring to a company's culture (Li et al., 2018). According to Borja et al. (2021), in their research, it is argued that there should be an organisational innovative climate in order to encourage innovative work behaviours of employees in the entire organisational structure. As a result of the analyses, the positive effects of organisational innovation climate on both strategic innovation orientation and individual innovative behaviour are directly proportional to the explanations made. With the support of the hypotheses, if the organisational innovation climate can be successfully achieved in companies with R&D departments, the strategic innovation orientation will be positively affected, and the companies can realise strategic innovations. At the same time, with the successful establishment of the organisational innovation climate, individual innovative behaviours are affected positively, and employees contribute to companies with innovative behaviours. The basis of competition in business life is technological innovations, and strategic innovation is the name given to the radical business model necessary for companies to find creative ideas.

It is stated that strategic innovation can bring about new approaches in this key task, and as a result of this situation, competitive advantage can be seized (Liang and James, 2009). Talke et al. (2011) studied article manufacturers by using document analysis, survey and capital market data investigating how the diversity and characteristics of administrative management affect business innovation and performance in terms of strategic innovation orientation. In general, they state that the strategic innovation orientation with the hypotheses they test positively affects the innovativeness of the firm. As a result of the study, it has been shown that the experience of the administrative team regarding their functional, educational, organisational, and sectoral backgrounds has a strong positive effect on the innovation orientation of enterprises. As a result of the analyses, the fact that strategic innovation orientation positively affects individual innovative behaviour- both as a mediation variable and as an independent variable- shows that it supports the explanations made in the literature. It is important that the results obtained as a result of the research and analyses in the literature support each other, as well as it is important for future studies in different sectors.

Having an understanding of innovation in the culture of the organisation in order for the innovation to take place in the organisation and to affect the performance outputs is key. In other words, the ability of an organisation to innovate is measured by the fact that the employees of the organisation have cultural values that enable them to develop new behaviours (Hurley et al., 2005). At the same time, it can be said that innovations in the field of management express the changes in the organisational culture that affect the innovative product and service performance. According to the results of the analysis that the individual innovative behaviour of the employees is important in the formation of this effect, it is also supported by the H1 hypothesis. Therefore, organisational innovation is an organisational process that encompasses technological, scientific, financial, and commercial steps and leads to the realisation of innovations. While this process can sometimes be a new activity on its own, it can also be necessary activities that contribute to the realisation of innovations (Van Lancker et al., 2016).

Because the successful realisation of innovations also ensures success in strategic terms. This situation is supported by the positive effect of management innovation on strategic innovation orientation, as stated in the H2 hypothesis in the analysis results. Organisational innovations include significant changes in organisational structure, management systems, knowledge and managerial skills used for management work, and job designs and reward systems that enable a business to be managed successfully and to use its resources effectively (Jia et al., 2018). Organisational innovation contributes to the process of creating ideas for new problem solving with participatory management in the organisational environment. With this contribution, the individual innovative behaviour of the employees can also improve. As a result of the analysis, H3 hypothesis is supported by the positive effect of organisational innovative climate on individual innovative behaviour. The explanations in the literature and the support of the hypotheses in the research results show the importance of management innovation and organisational innovation climate for organisations.

In order for companies to be successful in the competitive race and gain a competitive advantage, they need to support the strategic innovation climate and individual innovative behaviours. As a result of the analyses, this situation can be explained by supporting the H4 and H5 hypotheses. In this aspect, management innovation and organisational innovative climate should be applied in organisations. It is important for individuals to be innovative in order to support individual innovative behaviours in organisations because some individuals may be inclined to take too many risks in the process of adopting the innovation, depending on their differences in their innovative tendencies (Park and Kim, 2022).

Craig (2015) describes the characteristics of innovative individuals who are open to new experiences, who go out of their way not only to seek excitement but to experience different and new experiences, and most importantly, who tend to use the information sought or accidentally encountered constructively and are open to the opinions of other people. For this reason, in order for individual innovative individuals to be positively supported within the organisation, the organisation should also have an innovative structure. When evaluated in general, it is observed that many innovations realised within the framework of organisational activities are evaluated together in the context of the innovation capacity of the organisation and considered as organisational innovation: Innovations made by the organisation to improve its products; innovations created in the processes it develops within the framework of its activities; innovations made in the context of management in which it determines the basic principles that concern all activities. This situation can be explained by supporting the H6 and H7 hypotheses as a result of the analysis. All behaviours and beliefs with its inclusive and impressive features of all types can be considered as innovations that give the organisation innovative capability in a holistic sense. It can be emphasised that these innovation development behaviours can contribute to the sustainability of the organisation's management innovation by being embedded in the values and beliefs of the organisation over time.

7 Conclusions

Innovation is the cornerstone of sustained success in today's competitive business landscape (Afshar Jahanshahi et al., 2020b; Jahanshahi et al., 2019, 2021; Tajeddini et al.,

2017). It empowers organisations to distinguish themselves from rivals by offering distinctive and superior products, services, or processes, which in turn attracts and retains customers, ultimately securing a competitive advantage. This research, focusing on the machinery industry, delved into the intricate dynamics of innovation within organisations, particularly the impact of management innovation and the cultivation of a supportive innovative workplace climate on the innovative behaviour of middle-level managers.

The cross-sectional survey conducted among 300 middle-level managers yielded compelling findings. It was established that both management innovation and a workplace climate that encourages innovation significantly contribute to enhancing strategic innovation orientation within organisations. This, in turn, spurs middle-level managers to exhibit more innovative behaviours in their roles.

These findings are not only of practical importance but also hold theoretical and strategic significance. For organisations committed to amplifying their innovative capabilities, the research underscores the critical role played by management innovation and the creation of an environment that fosters innovation. The ability to promote strategic innovation orientation among managers offers organisations a vital edge in today's dynamic business environment.

Furthermore, the outcomes of this study provide valuable guidance for future research endeavours. Researchers can explore the nuanced intricacies of management innovation, workplace climate, and their influence on innovation behaviour in more depth. This, in turn, can fuel a greater understanding of the multifaceted world of innovation in organisations.

From a strategic perspective, the research results offer actionable insights for organisational decision-makers. They underscore the value of investing in management innovation and fostering a workplace culture that champions innovation as integral to maintaining a competitive edge. For policymakers, these findings serve as a foundation for informed policies that promote innovation at the organisational level, ultimately contributing to broader economic growth.

In conclusion, this research augments our comprehension of the driving forces behind innovation within organisations, emphasising the significance of management innovation, innovative workplace climates, and strategic innovation orientation. These insights hold the potential to catalyse meaningful change in how businesses and policymakers approach innovation, reinforcing the idea that innovation is not just a strategy but a necessity for thriving in the modern business world.

8 Managerial and practical implications

The model proposed in this research offers valuable guidance to company managements in the production sector, enabling them to successfully implement strategic innovation orientation and foster individual innovation. The model emphasises the significance of both management innovation and organisational innovation, which are crucial in positively influencing individual innovative behaviours, especially within R&D departments. To effectively achieve this, managers must demonstrate a genuine intention to embrace innovation and be receptive to new ideas. Companies that resist adopting the concept of innovation and remain closed to global developments will find it challenging to compete in today's intensely competitive environment.

Considering the implications of this research, the rapid changes in the technology sector and the globalised nature of business have created a highly competitive landscape across all industries. Companies can no longer survive merely by imitating products and services from others. Embracing innovation becomes essential for organisations to gain a competitive advantage. Implementing both management and organisational innovations is a key approach to fostering strategic innovation orientation and individual innovative behaviour in this competitive setting. In essence, innovation should become the fundamental skill of companies.

The research highlights the importance of adopting an innovative approach to encourage individual innovative behaviours within organisations. This requires top management's commitment to embracing and successfully implementing an innovative culture throughout the organisation. Conducting research in innovative sectors with rapid technological advancements will greatly contribute to the literature. Furthermore, studying companies at the forefront of technology development globally will introduce novel concepts to the field. Researchers are encouraged to prioritise their research with a global perspective, as it holds significant relevance and impact. By thinking globally and exploring innovative sectors, researchers can uncover valuable insights to drive organisational success through innovation.

9 Limitations and future research

Considering the limitations of this research, it is crucial to account for them in future investigations, particularly given that the study was conducted in companies with R&D departments located in organised industrial zones in Istanbul, Turkey's most significant city. When research spans various sectors, the types of companies and data sources become pivotal considerations. Moreover, it's essential to recognise the limitation of the sample group, which primarily consisted of experts and managers. Since this research specifically focuses on individuals with decision-making authority in management and strategic domains, it is incumbent upon future studies to acknowledge this when exploring the behaviours of employees lacking such authority. It is reasonable to anticipate variations in results in research conducted across different companies or within distinct organisational structures across various sectors. Nevertheless, the significance lies in contributing to the literature by deducing and contrasting outcomes obtained from diverse sectors in future research endeavours.

By addressing these limitations and conducting comprehensive investigations that encompass a range of sectors and organisational hierarchies, a more exhaustive understanding of the relationship between innovation and strategic orientation can be attained.

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