

**Exploring Innovation in the Public Sector:  
Study of direct and indirect effects of  
psychological safety, learning behaviour,  
transformational leadership and learning  
attitudes on innovation climate**

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## **Exploring Innovation in the Public Sector: Study of direct and indirect effects of psychological safety, learning behaviour, transformational leadership and learning attitudes on innovation climate**

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### **ABSTRACT**

Innovation climate is an aspect of public sector work teams that has seldom been studied, despite the increasing demands for digitalization that necessitate innovative solutions. This study aims to understand the drivers of innovation climate using Partial Least Square – Structural Equation Modelling analysis (PLS-SEM).

The findings indicate that transformational leadership and learning attitude have indirect effects innovation climate, whilst learning behaviour and psychological safety have significant and positive direct effects. Among these, psychological safety emerges as the strongest driver.

**Key words:** Innovation, innovation climate, digitalization, transformational leadership, learning attitude, learning behaviour, psychological safety, PLS-SEM

### **Introduction**

Innovation in private businesses has been extensively studied, providing significant insights into the processes driving social and economic changes. However, public sector innovation is also crucial, given its importance for growth, welfare, and employment (Jan Fagerberg, Bengt-Åke Lundvall and Martin Srholec 2018). The increasing number of public service users and the likely stagnation in resource availability necessitate new approaches to maintain pace with societal development (Sarah Hean, Elisabeth Willumsen, Atle Ødegård and Ståle Bjørkly 2015). One strategy for fostering innovation within organizations is to cultivate internal work climates that support and incentivize innovative efforts (Mumford, 2000). This study examines the innovation climate in the public sector, focusing particularly on IT teams and digitalization. It aims to identify factors that enhance this climate, specifically transformational leadership, learning attitude, psychological safety, and learning behaviour, using well-established measures with demonstrated validity and reliability. Control variables include group size, group duration, horizontal and vertical differentiation, management style, and team organization

### ***Theory and Hypotheses***

The increased digitalization in the public sector demands an increase in innovative solutions and previous research has found several factors that distinguish innovation in the public sector from that in the private sector. An important difference is that the public sector does not operate in a market-oriented manner and is thus not driven by profit-seeking motives, and the users of public services usually have no opportunity to change their service provider (Bloch and Bugge, 2013). Added value for the public sector comes from: 1) better services, with regard to efficiency, quality, user satisfaction, increased usage, more choices and more equal treatment through the services; 2) social consequences, such as social cohesion, equality, distribution of wealth, security, reduction of poverty, a better educated population and improved health; and 3) trust and legitimacy, which implies a better perception by public service-providers of their responsibility in meeting the population's needs, and faith in the public sector acting in line with social responsibility (Bloch and Bugge, 2013). The most important defined strategies and practices that influence innovation in the private sector are argued to also be valid in the public sector, regardless of the organizational context (Demircioglu and Audretsch, 2017). A study of the variables that potentially foster innovation in the public sector is therefore vital.

### ***Innovation Climate***

Over the past two decades, there has been a growing interest and empirical research into the concept of innovation climate (Alexander Newman, Heather Round, Shuanglong Wang and Matthew Mount 2020). This interest stems from the idea that a conducive innovation climate enhances both the quantity and quality of innovation outcomes (West and Farr, 1990). Researchers have primarily explored how employees' perceptions of their work environment influence their attitudes and behaviours (Christopher Parker, Boris Baltes, Scott A. Young and Joseph W. Huff 2003). While various definitions have been proposed, they generally revolve around employees' perceptions of how supportive their team or organizational environment is towards innovation (Newman et al., 2019; Newman et al., 2020). Due to challenges in measuring innovation in the public sector (Demircioglu and Audretsch, 2017, 2019), the concept has been broken down into subcategories to gain a more precise understanding and study their impacts (Anderson and West, 1998). The team climate inventory (TCI), developed by Anderson and West (Anderson and West, 1996, 1998), is the most widely used approach. It comprises four central factors. One key factor is 'vision,' which represents a valued outcome and serves as a motivating force in the workplace (West and Farr, 1990: 310). Organizations that innovate effectively often have clear visions and organizational goals embraced by their employees (Wang and Rafiq, 2009). Another factor is 'participative safety,' which refers to an environment where involvement in decision-making is encouraged and occurs without fear of interpersonal repercussions (West and Farr, 1990: 311). High levels of participation in decision-making are linked to lower resistance to change and increased likelihood of innovation (Wall and Lischeron 1977 in West and Farr, 1990: 312). 'Task orientation' or 'climate for excellence' is the third factor, focusing on the collective commitment to task quality and performance standards aligned with organizational goals (West and Farr, 1990: 313). This factor emphasizes the continuous improvement and rigorous evaluation of solutions, which are essential for innovation and efficiency. The fourth factor, 'norms and innovation support,' pertains to the organizational norms and practices that encourage and support the introduction of new ideas and improvements (West and Farr, 1990: 315). This includes both verbal encouragement and practical support for

innovation efforts. Organizations that value innovation often allocate time for idea development and reward successful attempts, fostering a culture where experimentation and learning from mistakes are valued (Daft, 1986; Peters and Waterman, 1982 in West and Farr, 1990: 315). In summary, the concept of innovation climate has garnered significant attention in recent research due to its potential to enhance innovation outcomes through supportive organizational environments and employee perceptions of these environments.

### *Psychological Safety*

Organizations are increasingly requiring their employees to contribute to ongoing improvements in organizational processes and practices through proposing new ideas, collaborating with colleagues, and experimenting with alternative approaches (Edmondson, 1999). While these activities can benefit the organization, they also pose risks for individuals (Detert and Burris, 2007). Psychological safety is crucial in this context. For instance, recent longitudinal research conducted by Google's People Analytics Unit identified psychological safety as the most important characteristic of successful, high-performing teams (Bergmann and Schaeppi, 2016). In this study, psychological safety is defined as the shared belief that it is safe to take interpersonal risks within a group (Edmondson, 1999). Such beliefs are typically implicit—they are assumed rather than explicitly discussed by individuals or teams. Psychological safety entails confidence that the group will not ostracise, reject, or penalise someone for making mistakes, and it is fostered by interpersonal trust and mutual respect. A high level of psychological safety is believed to significantly influence the innovation climate, with numerous studies linking it to organizational innovation (Marius Andersson, Øystein Moen and Per Olaf Brett 2020; Baer and Frese, 2003; Edmondson, 2018).

Hypothesis 1: Psychological safety has a positive effect on innovation climate

### *Learning Behaviour*

Learning within organizations and teams is widely believed to positively influence innovation (Mary M. Crossan, Henry W. Lane and Roderick E. White 1999). According to management literature, effective learning hinges on several factors, including attentiveness to feedback (Schön, 2017), a willingness to experiment (Henderson and Clark, 1990), and openness to discussing failures (Leonard-Barton, 1995; Sitkin, 1992). Research supports the benefits of feedback-seeking among individual managers (Ashford and Tsui, 1991), teams seeking external information and feedback (Ancona and Caldwell, 1992), and research and development teams that frequently experiment (Henderson and Clark, 1990). Errors, in particular, serve as valuable learning opportunities by revealing when something did not go as expected, making it essential to openly discuss and learn from them (Schein, 1993; Sitkin, 1992). In environments where teams face change or uncertainty, the potential gains from learning often outweigh the risks of investing time in experimentation and feedback. Such learning behaviours are crucial for teams to understand their surroundings and effectively coordinate members' actions. Even in settings where teams perform routine tasks, fostering a culture of learning is essential for self-management and periodic process improvements.

Hypothesis 2: Learning behaviour has a positive effect on innovation climate

Psychological safety has been found to be useful in understanding learning processes in groups (Edmondson, 1999). Learning behaviour is often understood as behaviour characterised by asking questions, seeking feedback, experimenting, reflecting on results, and discussing mistakes and consequences. Previous studies have established empirical support for the hypothesis that psychological safety has a significant positive effect on a group's learning behaviour, which in turn can significantly affect the group's innovation climate. An important consequence of these findings is that groups with psychological security exhibit a high level of learning behaviour and can develop and change their situation if it is not optimal, whereas those without psychological security demonstrate little learning and are thus more likely to need intervention to change the situation (Edmondson, 1999). Psychological safety is assumed to facilitate learning behaviour because it reduces concern about others' reactions to behaviours that have the potential for embarrassment or threat. Experimentation with new approaches in the workplace might ultimately be unsuccessful, viewed as a failure, and lead the individuals involved to be seen in a negative light (Van Dyne and LePine, 1998). Consequently, there is growing evidence to indicate that such risks may lead employees to avoid contributing to learning processes, thereby inhibiting both individual and organizational learning (Detert and Burris, 2007). Providing a psychologically safe work environment—one in which employees feel safe to voice ideas, willingly seek feedback, provide honest feedback, collaborate, take risks, and experiment—is one way to overcome such threats to individual and organizational learning (Edmondson, 1999). Psychological safety is especially important in work environments where employee and customer safety are paramount, such as in the healthcare or aviation industries, as it has been shown to be critical in reducing employee errors and enhancing safety (Nembhard and Edmondson, 2006), as well as increasing team and individual learning across multiple organizations (Aida Ortega, Miriam Sánchez-Manzanares, Francisco Gil and Ramon Rico 2010). Extant literature reveals positive associations between psychological safety and learning behaviour (Alexander Newman, Ross Donohue and Nathan Eva 2017). This has also been found in work teams across several empirical studies (Ortega et al., 2010; Ortega et al., 2014; Roberto, 2002; Stalmeijer et al., 2007; Piet Van den Bossche, Wim H. Gijssels, Mien Segers and Paul A. Kirschner. 2006).

Hypothesis 3: Psychological safety has a positive effect on learning behaviour

*Learning Attitude*

In this study, attitudes are seen as cognitive and affective orientations or dispositions towards an object, idea, person, situation, et cetera (Fiske, 2020). Attitudes may affect an individual's behaviour in the presence of attitude-objects in predictable ways (Ajzen, 1980). However, this predictive relationship does not always hold, and the likelihood that exhibited behaviours correspond with predicted ones is higher when attitudes are stable and strongly held, embedded in the individual's belief system, concern a domain that the individual knows well, are formed from personal, relevant experience, and are considered important by the individual (Fiske, 2020). As described by Boekaerts and Simons (2014), individuals' attitudes affect their experience in learning situations to which those attitudes apply, thereby affecting the perception of competence in meeting perceived task demands – the system of personal agency called self-efficacy (Bandura and Wessels, 1997: 57).

When individuals expect to be able to meet demands, they activate a learning intention, preparing them to invest effort in learning behaviour. Conversely, when they doubt their ability to meet demands, they activate a coping intention, falling back on coping behaviours.

Hypothesis 4: Learning attitude has a positive effect on learning behaviour

### *Transformational Leadership*

Previous studies have shown the importance of managers' attitudes and beliefs for innovation (West and Farr, 1990). Leadership that is democratic, cooperative, and involving is most likely to promote innovation (Peters and Waterman 1982 in West and Farr, 1990: 313). A flat organizational structure and decentralisation are also argued to promote innovation because they provide more autonomy, greater commitment, and a freer flow of information and knowledge (West and Farr, 1990).

In this study, the focus is on transformational leadership, which is characterised as an adaptable and flexible leadership style that encourages followers to do more than they originally expected. It broadens and changes their interests, leading to conscientiousness and acceptance of the group's purposes (Bass, 1985; Bernard. M Bass, Bruce J. Avolio, Dong L. Jung and Yair Berson 2003; Bass and Riggio, 2006). This leadership style is found to have a positive effect on employees' commitment, motivation, and performance (Arnold et al., 2007; Timothy DeGroot, Scott Kiker and Thomas C. Cross 2000; Uldarico Rex Dumdum, Kevin B. Lowe, and Bruce J. Avolio 201; J. Bryan Fuller, Coleman E.P Patterson, Kim Hester and Donna Y. Stringer 1996; Judge and Piccolo, 2004; Meyer et al., 2012; Karina Nielsen, Raymond Randall, Joanna Yarker and Sten-Olof Brenner 2008; Gang Wang, In-Sue Oh, Stephen H. Courtright and Amy E. Colbert. 2011; Wolfram and Mohr, 2009). In a recent meta-analysis, however Wang et al. (2011) showed that this leadership type has a stronger effect on employees' attitudes and motivation than on their performance. At the group level, research suggests a positive association between transformational leadership and the quality of the group's experience (Susanne Braun, Claudia Peus, Silke Weisweiler and Dieter Frey 2013; Jung and Sosik, 2002; Choi Sang Long, Wan Mardhia M. Yusof, Tan Owee Kowang and Low Hock Heng 2014; Karina Nielsen, Joanna Yarker, Raymond Randall and Fehmidah Munir. 2009) and the group's autonomy (John K Butler Jr., Stephen R. Cantrell, R. S and Randall J. Flick, R. J 1999; Jerry C. Wofford, J. Lee Whittington and Vicki L. Goodwin 2001).

Transformational leadership is considered a process of influence that is capable of moving social systems, aiming to make employees agents of change for the organization's movement and development (Fuller et al., 1996; Judge and Piccolo, 2004; Meyer et al., 2012; Nielsen et al., 2008; Wang and Rafiq, 2009; Wang et al., 2011; Wolfram and Mohr, 2009). It has also been argued that transformational leaders cultivate a climate of psychological safety, encouraging followers to take interpersonal risks and express themselves to realise their potential and grow. To alleviate the dependence associated with charismatic leadership (idealised influence and inspirational motivation), whereby followers may view leaders as extraordinary and exceptional (Ronit Kark, Boas Shamir and Glad Chen et 2003; Yukl, 1989), charismatic leaders achieve 'transformational effects' (Boas Shamir, Robert J. House and Michael B. Arthur 1993) by communicating confidence in their followers' ability to meet higher performance

expectations. They boost followers' self-concept, enhance their self-esteem and self-worth, and harness their motivational forces of self-expression (Boas Shamir, Robert J. House & Michael B. Arthur 1993). Detert and Burris (2007) found that when leaders engaged in individualised consideration and inspirational motivation behaviours, followers reported a higher level of psychological safety. As Edmondson stated: "If the leader is supportive, coaching-oriented, and has non-defensive responses to questions and challenges, members are likely to conclude that the team constitutes a safe environment" (1999: 356). Additionally, when leaders intellectually stimulate their followers and encourage them to question assumptions (Ann Yan Zhang, Anne S. Tsui and Duan Xu Wang 2011), they send a clear message that followers can feel psychologically safe and that it is legitimate and even expected for them to speak up and express themselves openly without fear of negative interpersonal consequences (Kahn, 1990). This is especially the case when leaders provide support and encouragement, and show empathy (Abraham Carmeli, Roni Reiter-Palmon and Enbal Ziv 2010). For example, it has been shown that leaders who instil trust among followers help to facilitate conditions in which members feel comfortable expressing their own opinions (John Schaubroeck, Simon S.K. Lam and Ann Chunyan Peng 2011). It has also been argued that transformational leaders provide their followers with a 'secure base' from which to explore and serve as a 'safe haven' when a threat looms (Popper and Mayselless, 2003). Leaders may help followers regain confidence and embark on a course towards autonomy and self-actualisation. Thus, we propose the following hypothesis:

Hypothesis 5: Transformational leadership has a positive effect on psychological safety

## **Methodology**

The study was conducted in the Norwegian Labour and Welfare Administration (NAV), which employs around 22,000 people. To achieve pseudo control (Bollen, 1989) and reach the employees most relevant to the study, various IT departments were selected. The sampling was executed by emailing a link to the survey to 496 employees in the IT departments. After two reminders, 30.7% of the employees had responded to the survey. To ensure that the respondents had the necessary knowledge, they were asked to indicate which unit they belonged to and how long they had been employed in that unit. We included questions for key informants about how long they had held their current position to exclude those who had worked for less than six months from the analyses. However, no respondents were excluded, as all had been employed for more than six months. The Team Climate Inventory (TCI) scale introduced by Kivimäki and Elovainio (1999), consisting of 14 items, was used. The Global Transformational Leadership (GTL) scale by Carless et al. (2000) was employed to measure leadership. Learning behaviour and psychological safety were assessed using measures introduced by Edmondson (1999). Learning attitude (learning from mistakes) was measured by the scale introduced by Cannon and Edmondson (2005). Six control variables were included in the study: group type, group inception, team size, vertical differentiation, horizontal differentiation, and the nature of the team's organization (autonomy, interdisciplinary or multidisciplinary) (Eric Sundstrom, Michael McIntyre, Terry Halfhill and Heather Richards 2000). The questionnaire was pre-tested by consultants familiar with the study environment but not employed by NAV. After the pre-test, a few spelling errors and potentially unclear sentences were corrected before the survey was launched within the organization. The analysis was conducted using the analysis programs SPSS

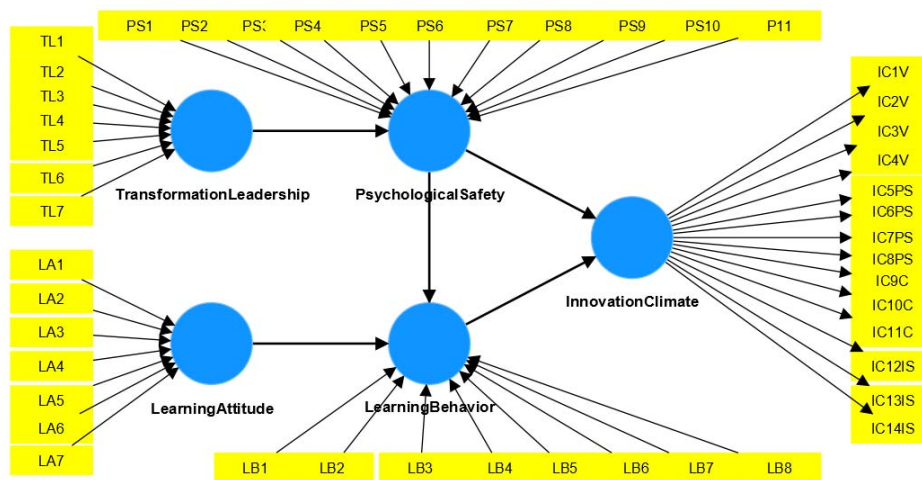
and Smart PLS, which provided an integrated approach to data analysis and theory construction. This approach allowed the researcher to simultaneously evaluate both the measurement and the structural (causal) components of the model.

## Results

The measurement model was highly satisfactory, with only two items having a factor loading of .500, while the rest were higher. The discriminant factor analysis was also very satisfactory, and the Cronbach's alpha analysis showed results above .900 for all variables. Innovation climate was considered a formative measure, while the rest were considered reflective measures, and the results of the measurement model indicated validity consistent with previous research.

All the hypotheses were supported, and the research model indicated a good fit. The model fit SRMR was 0.071, indicating a good fit (Hu and Bentler, 1999).

**Figure 1: Model**



In Figure 1 we can see that psychological safety also has a strong positive significant effect on learning behaviour ( $t = 10.303, p = .000$ ), with a weak indirect effect, indicating that psychological safety is more of a strong direct effect rather than an indirect one. Given that learning behaviour is an important variable for innovation climate, the model includes learning attitude to understand what shapes this variable. Learning attitude has a positive significant effect on learning behaviour ( $t = 10.303, p = .000$ ), and the indirect effect (.285) indicates an indirect effect on innovation climate.



**Table 1: Results**

Variable	Hypothesis	Std. Beta (Indirect effect)	t	P
Psychological safety	H1	.440	6.502	.000
Learning behaviour	H2	.443	6.540	.000
Psychological safety	H3	.662 (.097 pls)	10.303	.000
Transformational leadership	H4	.560 (.385 pls)	8,190	.000
Learning attitude	H5	.487 (.285 pls)	10.303	.000

Table 1 is showing how psychological safety appears to be the most important factor, and the model includes transformational leadership to understand how organizations can enhance psychological safety. Transformational leadership has a strong positive significant effect on psychological safety ( $t = 8.190$ ,  $p = .000$ ), and the indirect effect (.385) also indicates that this is an important variable for innovation climate.

Table 2 summarizes the study's results and shows that the hypotheses are supported by the statistical findings. It indicates that all direct effects are significant, and that psychological safety is overall the most important variable. Psychological safety has a direct effect on both the innovative climate and learning behaviour. Transformational leadership has a positive and strong effect on psychological safety and also an indirect effect on the innovative climate. This means that as psychological safety increases, the innovative climate will also improve. The final row summarises the model test using PLS-SEM, showing that the model is significant.

**Table 2: Summary**

Test		Summary
Psychological safety on Innovation Climate	H1	Supported. Significant positive and moderate effect.
Learning behaviour on Innovation Climate	H2	Supported. Significant positive and moderate effect.
Psychological safety on Learning behaviour (indirect effect on Innovation Climate).	H3	Supported. Significant positive and strong effect on learning behaviour. Weaker indirect effect on innovation Climate.
Transformational leadership on psychological Safety (indirect effect on innovation Climate).	H4	Supported. Significant positive and strong effect on Psychological Safety. Moderate effect on Innovation Climate.
Learning attitude on Learning Behaviour (Indirect effect on Innovation Climate).	H5	Supported. Significant positive and strong/moderate effect on Learning behaviour. Weak indirect effect on innovation Climate.
Test of the overall model (PLS-SEM)		The model has a good fit.

## **Discussion**

The study finds that enhancing innovation in the public sector requires fostering psychological safety. This suggests that organizations should prioritize creating environments where employees feel safe to express ideas and take risks without fear of negative consequences. By doing so, public sector organizations can enhance their capacity for innovation by strengthening the innovation climate. The findings also emphasize the importance of transformational leadership in promoting psychological safety. Leaders who inspire and motivate their teams can significantly enhance the innovation climate by fostering a sense of security and trust. The positive effects of learning behaviour and attitude on the innovation climate suggest that encouraging continuous learning and openness to feedback can further enhance innovation climate. These findings may share broader implications for policy-making and strategic planning in the public sector. By understanding the role of psychological safety, policymakers are in a position to design interventions that support these factors, ultimately leading to more efficient and effective public services.

## **Conclusion**

This study examined key variables influencing the innovation climate within public sector work teams, focusing on psychological safety, transformational leadership, learning behaviour, and learning attitude. Using PLS-SEM, the research identified psychological safety as the most significant factor in enhancing innovation climate.

This finding suggests that fostering an environment where employees feel safe to express ideas and take risks is crucial for innovation. Transformational leadership was also shown to have a strong positive effect on psychological safety, indicating that leaders who inspire and motivate their teams can significantly enhance the innovation climate by building trust and security. The study also highlighted the importance of learning behaviour and learning attitude, which play critical roles in shaping an innovative work environment. Encouraging continuous learning and openness to feedback can further enhance innovation capabilities.

The research was conducted within IT work teams to ensure pseudo-isolation; however, future studies could explore different types of work teams and environments to test the model's reliability across various contexts. By elaborating on the implications described above, this study provides valuable insights into how public sector organizations can leverage these findings to enhance their innovation capabilities, ultimately contributing to improved service delivery and organizational performance. The study focused on specific variables influencing Innovation Climate, but other potentially significant factors were not included due to questionnaire constraints. Future research could investigate additional variables to provide a more comprehensive understanding of how to foster Innovation Climate across different settings. These variables might include management support, resource availability (e.g. adequate funding), autonomy and freedom, work challenges, and time resources for idea development. Moreover, social factors such as supervisor support, teamwork, knowledge sharing, team diversity and trust could be explored. Additionally, more individual factors could be included, such as intrinsic motivation versus extrinsic motivation, self-confidence, self-efficacy and

openness to new experiences. Future research should continue to explore moderators or other variables that may affect the relationships identified in this study, offering further guidance for policymakers and practitioners aiming to cultivate innovative climates in public sector organizations. By expanding the scope of variables examined, researchers can develop a more nuanced understanding of the complex dynamics that contribute to Innovation Climate in various organizational settings. This comprehensive approach would not only enhance the theoretical framework but also provide practical insights for leaders and managers seeking to foster innovation within their teams and organizations.

### **About the Author:**

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