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Fostering Innovative Work Behavior through Job Autonomy and Employee Work Passion: Moderating Role of Communication Climate

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Abstract

In today's rapidly evolving business landscape, employees' innovative work behavior (IWB) stands out as a fundamental factor in organizational success. Despite its critical importance, there remains a gap in understanding and measuring IWB, particularly within the branch of research and development (R&D) organizations. This study seeks to address this gap by exploring the relationships between communication climate, job autonomy, employee work passion, and innovative work behavior among employees in Malaysian R&D organizations through a sample of 325 respondents. By using a quantitative approach, this research utilized surveys to collect data from employees working within Malaysian R&D organizations. The sample was carefully selected to cover various sectors within R&D. The data collection process relied on the Innovative Work Behavior (IWB) scale. The analysis of the survey findings uncovers relationships between communication climate, job autonomy, work passion, and innovative work behavior within Malaysian R&D contexts. The research reveals significant correlations among these variables, offering valuable insights into the factors influencing employees' inclination toward innovation. This study holds substantial implications for both scholars and practitioners in the fields of organizational behavior and management. By explaining the drivers of innovative work behavior within R&D organizations, this research provides actionable insights for nurturing a culture of innovation and enhancing organizational effectiveness.

Keywords: job autonomy, communication climate, work passion, innovative work behavior, human resource management

1. Introduction

Research and development (R&D) activities serve as the cornerstone for companies striving to innovate and introduce novel products and services into the market. It marks the initial phase in the development process, aiming to enhance companies' competitive edge and bolster their bottom line (Kenton, 2024). R&D endeavors are pervasive across all sectors and industries, driving growth through continuous improvements and the creation of new offerings. Notably, sectors such as pharmaceuticals, semiconductors, and technology allocate substantial resources towards R&D initiatives (Kenton, 2024).

R&D is fundamentally linked to innovation, catalyzing companies to maintain their competitive position (Kenton, 2024). Missing an R&D program, companies risk falling behind and may resort to alternative strategies like mergers or partnerships to foster innovation. Through R&D, companies can innovate by developing new products and refining existing ones (Savrul & Incekara, 2015). Unlike operational activities, R&D endeavors typically prioritize long-term profitability over immediate gains (Motohashi, 2015). Additionally, R&D efforts may yield intellectual property assets such as patents, copyrights, and trademarks, further solidifying a company's competitive position (Kenton, 2024).

The Malaysian government's introduction of the Research Universities (RU) project in 2007 signifies a significant commitment to advancing R&D capabilities. Four public universities were designated as RU, with a fifth joining later (Sheriff & Abdullah, 2017). Despite increased investment in R&D, Malaysia still lags in innovation compared to countries like Finland (Kaur, 2019). Nevertheless, Malaysia has made progress in increasing Gross Expenditure on Research and Development (GERD), nearly tripling since 2008 (Sheriff & Abdullah, 2017). This surge in R&D investment, coupled with the advent of the Fourth Industrial Revolution (IR 4.0), underscores the pivotal role of innovation in Malaysia's future economic landscape.

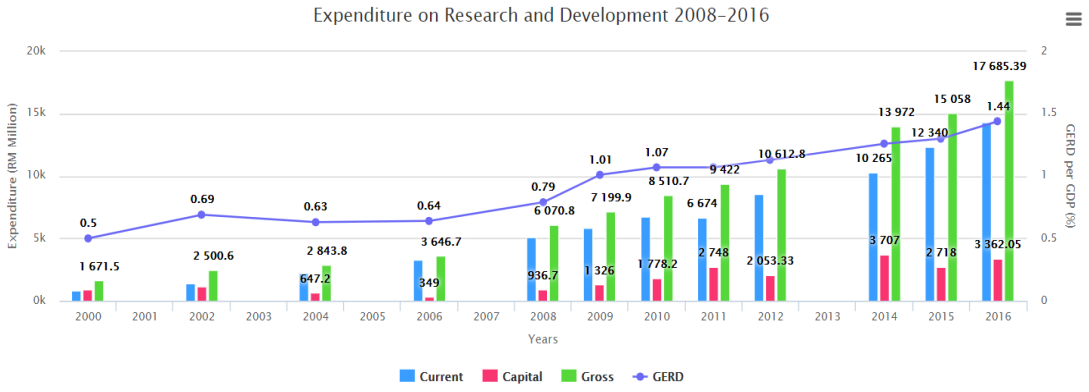


Figure 错误!文档中没有指定样式的文字。.1. Malaysian Expenditure on R&D Development 2008-2016

From the annual perspective, since 2008, Malysia's GERD has witnessed a handsome

increase. As compared to the preceding years, Malaysia's GRED was three times the size of the year 2008, with a staggering figure of RM 17,685 million. In addition to those mentioned above, a positive trend has also been observed, with a growth of 0.79% to 1.44 from 2008 to 2016 regarding the 2% targets of the National Policy on Science, Technology & Innovation by 2019.

The Fourth Industrial Revolution (IR 4.0) represents a paradigm shift driven by innovation, poised to reshape industries and societal norms (McKinsey, 2022). This revolution harnesses technologies like the Internet of Things (IoT) to revolutionize manufacturing processes and enhance automation, communication, and real-time data utilization. Innovation, defined as the adoption of new ideas or methods, stands as a linchpin for success in R&D organizations amidst today's fiercely competitive environment (Riyadi & Sumardi, 2017). It empowers employees to excel and adapt to evolving market demands, thereby driving productivity and profitability in energy industries (Riyadi & Sumardi, 2017).

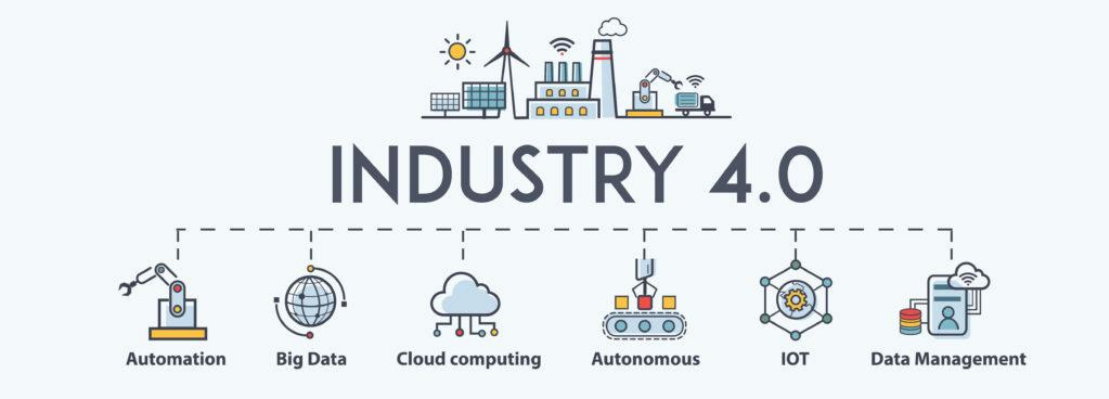


Figure 错误!文档中没有指定样式的文字。.2. Industry 4.0 Revolution

R&D activity has been instrumental in propelling Malaysia towards economic diversification and technological advancement. This proposed study seeks to delve into the significance of innovative work behavior within Malaysia's R&D organizations, with the ultimate aim of fostering a high-income, knowledge-based economy reliant on modern technology and innovation activities. Thus, this paper will examine the interplay between communication climate, job autonomy, and employee work passion, factors crucial in shaping innovative behavior within Malaysian R&D organizations.

R&D organizations within Malaysia's energy sector, particularly the oil and gas (O&G) industry, operate within a complex innovation ecosystem involving stakeholders from both the public and private sectors. This interconnected system aims to develop and deploy technologies, fostering the creation of new ventures and sustaining the O&G industry's vitality by extending field life and facilitating discoveries. The advancement of technology within Malaysian R&D, particularly in the energy sector, is crucial for domestic growth and economic progress.

However, a critical challenge in driving employees toward innovation within these organizations remains. Effective communication is a cornerstone in this effort, as organizations fostering positive communication climates tend to encourage active employee participation, facilitate the free exchange of ideas, and constructively resolve conflicts. On the contrary, organizations characterized by defensive communication climates often witness employees withholding their opinions, leading to diminished morale and preventing innovative behaviors.

Furthermore, the level of job autonomy afforded to employees also significantly influences their propensity for innovative work behavior. Research suggests that low job autonomy can induce job stress, undermining employees' confidence in achieving positive outcomes and subsequently diminishing their inclination toward innovation (Saragih, 2011). In addition to communication climate and job autonomy, employee work passion emerges as another crucial determinant of innovative work behavior. Organizations where employees are empowered to take risks and pursue new ideas tend to experience enhanced performance. Conversely, when work is undervalued and lacks intrinsic meaning, employees may exhibit unenthusiastic and un-innovative behaviors, ultimately impacting organizational performance (Burke et al., 2015; Johri et al., 2016; Oliveira, 2018).

Despite the recognized importance of these factors, limited empirical research exists on their specific impacts on Malaysian R&D organizations. Therefore, this study aims to address this gap by investigating the influence of communication climate, job autonomy, and employee work passion on innovative work behavior within Malaysian R&D organizations. Through a comprehensive analysis, this research seeks to provide insights into strategies for fostering a culture of innovation and enhancing organizational performance within the Malaysian energy sector.

2. Literature Review and Hypotheses Development

2.1 Job Autonomy and Innovative Work Behavior

While exploring the association between employee job autonomy and their innovative workplace behavior, this study expounds upon the seminal theories in the perspective of organizational psychology, e.g., the theory of self-determination and the famous job characteristics model (Hackman & Oldham, 1976; Hackmann, 2016; Legault, 2017; Mills & Allen, 2020). According to the literature, employees' freedom concerning their jobs, precisely the extent to which they are given the discretion and decision power to accomplish their tasks, is called their work autonomy and empowerment. (Khawand & Zargar, 2022; Liu et al., 2011). Prior literature proposes and supports this assumption that one's job autonomy can be the great catalyst of innovation in the workplace in the context of organizational behavior (Jang & Kim, 2023; Nie et al., 2023). As stated by Hackman & Oldham (1976), employees are expected to observe enhanced ownership and responsibility if they are provided with autonomy at their workplace, which ultimately improves their intrinsic motivation as well. Also, as observed by Amabile (1996), employees' creativity and willingness to participate beyond their stated role

and experiment with new ideas result from their enhanced intrinsic motivation.

Also, by eliminating strict rules and policies/procedures, job autonomy helps facilitate individual suppleness and the ability to look for methods that are not ordinary to the rising problems in the organizational context (Hackman & Oldham, 1976). Such instilled freedom and choice given to employees and its consequent innovative initiatives help employees to go beyond ordinary cognitive limitations, which change prevailing norms and exert pressure on the conventional ways of doing in organizations (Amabile, 1996; Amabile et al., 1994). The authority to move and control one's work and task instilled through a heightened sense of empowerment also helps foster efficacy individually and collectively among employees (Amabile, 1998;Amabile & Kramer, 2007; Daugavietis, 2021). The positive psychological state produces a conducive and constructive environment for creativity and innovation in the workplace.

Moreover, in the organizational context, employees are encouraged to experiment and learn from their mistakes through provided job autonomy. Job autonomy helps provide employees with the confidence to iterate their process and experiment with multiple ways to achieve optimum outcomes, and this is usually done through their ideas sharing and brainstorming activities (Amabile, 1996; Amabile, 1998). The iterative process requires flexibility in the procedures and methods of employees, hence fostering an innovative and continuous improvement environment at the workplace. Job autonomy is expected to positively influence innovative workplace behavior through intrinsic motivation, creativity, empowerment, and the adoption of a culture that promotes trial and error for learning and outcome improvements. Nonetheless, the following hypothesis is formed for empirical evaluation:

Hypothesis 1: Job autonomy positively impacts innovative workplace behavior

2.2 Employee Work Passion and Innovative Work Behavior

Individual motivation and organizational outcomes can be explored by looking at the word patient and innovative workplace behaviors in a more dynamic workplace setting. According to the self-determination theory and the conservation of resource theory (Hobfoll, 1989; Mills & Allen, 2020), the intricacies between employee work patience and innovative work behaviors can be attributed to the emotional investment aspect that can also help foster innovation at the workplace for the organization as well As for the individuals. A deep-seated enthusiasm and positive affection towards individual jobs may explicitly drive individuals' creative and innovative behavior at work.

According to literature, it is much anticipated that having intrinsic motivation will instead work genuinely with pure interest in whatever they are doing, and they will feel enjoyment while doing it. This is only possible for those passionate about their jobs (Deci & Ryan, 1985; Legault, 2017). Research also supports this notion that a workforce who is motivated and has passion will fuel captivity and will come up with a new and will come up with new initiatives at work, but resting the time and additional efforts in developing and propagating new ideas

throughout their organization (Vallerand et al., 2003). Of many key drivers, few of them are meaningfulness and purposefulness of the activity and work that ultimately inspires the workforce to seek and look out for new opportunities and innovate their workplace to achieve their organizational goals (Vallerand et al., 2003).

Furthermore, the literature also suggested that two critical outcomes of passion at work are developing a sense of ownership and total commitment of the individual and the organizational missions, objectives, and values (Vallerand et al., 2003). The organization's success is closely associated with and is the direct outcome of the employee's passion for their active participation and going beyond routine roles. It is also important to mention that employees with a higher sense of passion will exhibit greater ownership of their work tasks, alternately challenging their status quo and mastering their innovation skills (Rosso et al., 2010). Also, while facing challenges, passionate individuals are expected to propagate behaviors that support change, preserve their resources to optimize their performance, and drive the obstacles with ease and interest.

Prior literature also supports this notion that passionate workers are more likely to collaborate with others in terms of different teams, and they are more likely to bring innovation to the processes by adding multiple viewpoints by adding multiple viewpoints (Bakker & Demerouti, 2007; Bakker & Schaufeli, 2008). Also, passionate employees do not focus on achieving excellence for themselves but encourage others to use their energy and enthusiasm to attain and inspire excellence, ultimately creating an environment that is positive and proactive (Rosso et al., 2010). Thus, such behaviors of the innovative workforce can create a collaborative synergy that collectively helps sustain the environment and help team ants' problem-solving capabilities produce a more excellent innovative environment. The ability of employee work passion for driving intrinsic motivation, cultivating a sense of ownership and commitment, encouraging collaboration and knowledge sharing, and inspiring proactive engagement in the pursuit of organizational goals is, in short, what positively impacts innovative work behavior. Organizations may foster a creative culture that drives long-term success and competitive advantage by utilizing and promoting people's enthusiasm for their jobs. Thereby, the following hypothesis is formed for empirical validation:

Hypothesis 2. Employee work Passion positively impacts innovative workplace behavior

2.3 Communication Climate and Innovative Work Behavior

This study aims to develop and test the hypothetical association between communication climate and innovative workplace behavior within the organizational context. Based on the early and seminal literature, e.g., Social information processing and job characteristics model, the study hypothesized that innovative work behavior is significantly predicted by organizational communication climate in the organizational context (Blanz, 2017; Hackman & Oldham, 1976; Nucci, 2004; Salancik & Pfeffer, 1978). An innovative workplace environment is expected to be established in any organization when the communication

climate is positive. There is openness to new ideas, the organization provides ample communication opportunities to all employees, fosters trust, and listens to everyone irrespective of their stature (Aunger et al., 2021; Gino & Staats, 2015).

Consequently, such organizations help the workforce to feel valued and empowered while sharing their thoughts and ideas, facilitate their collaboration efforts, and help them go beyond average engagement while providing solutions to the risen and anticipated problems and workplace, henceforth generating novelty and innovation at the workplace (Petermann & Zacher, 2022). In contrast to this, an environment that is filled with negativity and restricts or controls the flow of communications through visible and non-visible barriers (no transparency, repercussions for employees) is expected to dampen innovative work behaviors. In such a scenario, the workforce will be much more hesitant to share their insights, which will hamper the overall creativity culture and process, henceforth limiting organization development and growth. A deeper understanding of the communication factor and its complex interplay with innovation at work, which can shape innovative workplace behavior, can be of great importance for organizations. Thereby, the following hypothesis is formed for testing:

Hypothesis 3. Communication climate positively impacts innovative workplace behavior.

2.4 Moderating Role of Communication Climate Between Job Autonomy, Employee Work Passion, and Innovative Work Behavior

It is paramount to understand the intricacies associated with understanding the association between multiple and multifaceted factors that can potentially contribute towards the betterment of individual and organizational performance, specifically the innovation at work aspect (Bhatta et al., 2024). Out of many determinants for the performance of employees, job autonomy and passion for work stand tall as essential factors that can determine the innovative work behavior of an employee (Baig et al., 2022; Pundt, 2024; Zhang et al., 2023). Nonetheless, the magnitude and the strength of influence for each factor over performance are not expected to be uniform across multiple organizational contexts. Henceforth, the organizational communication climate is a vital factor that requires thorough investigation (Edwards & Hugman, 1997).

In past literature, job autonomy has been described as one's power and freedom to perform organizational tasks (Nie et al., 2023) and duties that may also result in innovation, and role autonomy may facilitate such innovative behaviors in the organizational context (Cai et al., 2018; Kohnen et al., 2023). Also, employees are expected to take the initiative and generate new ideas and solutions to upcoming issues and problems if they are equipped with autonomy at work (Weeks & Keen, 2009). Although the positive association between job autonomy and innovative workplace behavior is much anticipated and expected through prior literature, the effectiveness and magnitude of job autonomy may be contingent upon the prevailing communication climate, meaning that autonomy may be more effective when the communication climate is more

supportive and facilitates the functioning of given job autonomy.

In general, a supportive and conducive communication climate is equipped with open communication channels (Kelly et al., 2024; Lancaster, 1985; Pace, 1983; Pincus, 1986), thorough trust, and idea receptivity in the organization, and such factors are expected to improve the effect of job autonomy for innovative work behavior. Employees may leverage and invest more in their workplace when they experience empowerment and ultimately share their ideas and collaborate far beyond their reach, consequently driving innovation at their workplace. In contrast, an environment that is hostile and restricts or hinders the smooth flow of information may jeopardize the effectiveness of job autonomy, and that may decrease innovativeness at work, as the workforce may become hesitant to share their ideas and speak openly due to fear and repercussion (Amoadu et al., 2024; He et al., 2023; Lintanga & Rathakrishnan, 2024).

Further, there is another important contextual factor regarding individuals' passion for their work, e.g., cognitive and emotional association with their tasks and responsibilities, ultimately driving performance and innovative behavior (Stark, 2006). Novel ideas and solutions to problems, along with heightened work engagement, creativity, and persistence, are exhibited through employees who are passionate about their work. It is anticipated that the manifestation of passionate work behavior may be linked with a communication climate that facilitates and helps in many ways.

Also, a culture of innovation may be influenced by a workplace that fosters positive communication norms with reciprocal respect, value to different voices, and respect (Ahmed et al., 2023). As a result, employees may find it easy to express their thoughts and provide valuable insights while collaborating with colleagues/ordinates and subordinates, consequently fostering a culture of innovation collectively. In contrast, innovation culture may be hampered or obstructed by a work environment that hinders positivity through communication, spreads negativity, instigates conflicts, and spreads ambiguity, ultimately encouraging the individual not to invest their energies in innovative work behaviors.

Keeping the discussion above in view and summarising the context, the role of communication climate as a moderator between job autonomy, employee work passion, and innovative work behavior highlights the significance of organizational context to impact or shape innovative behavior. Henceforth, the following hypotheses are formed for empirical evaluation:

Hypothesis 4. Communication climate moderates between job autonomy and innovative workplace behavior.

Hypothesis 5. Communication climate moderates between employee work passion and innovative workplace behavior.

The proposed framework of this research uses job autonomy, communication climate, and

employee work passion as the independent variables; the dependent variable is innovative work behaviour, as depicted in Figure 2.1.

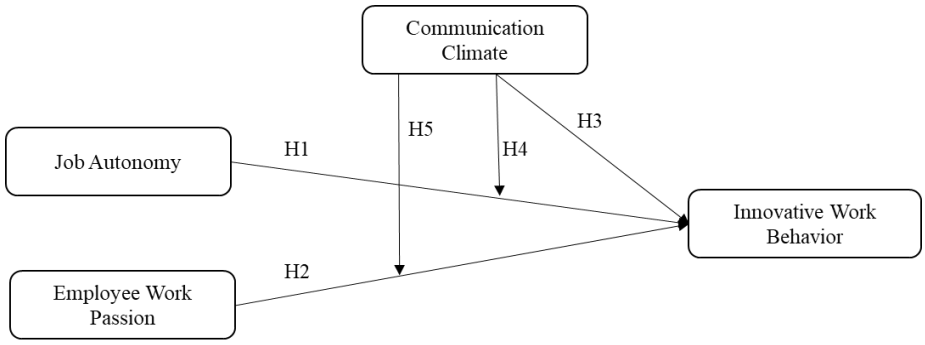


Figure 错误!文档中没有指定样式的文字。.3. Research Framework

3. Methodology

3.1 Research Design

This study employed a cross-sectional research design known to be used for quantitative assessment of the proposed theoretical relationship between variables of different natures (Cooper & Schindler, 2011). Cross-sectional research design entails collecting responses via a predefined questionnaire, in which respondents are required to respond to specific questions (at a particular time) for one time only. The cross-sectional research design helps respondents respond quickly and conveniently, and they are open to choosing any response to the given quantitative parameter against each questioning statement (Sekaran, 2006). The overall research process is explained through Figure 3.1.

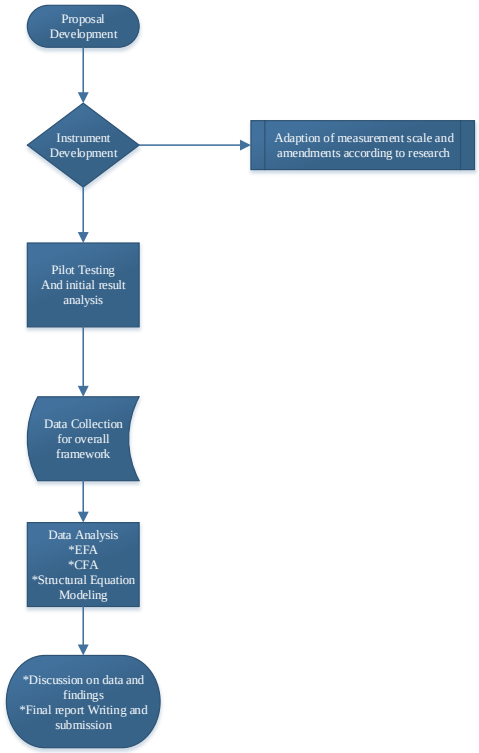


Figure 3.1. Overall Research Process

3.2 Research Instruments

The research instrument encompasses a meticulously crafted questionnaire, drawing upon validated scales and measures sourced from existing literature. The initial section comprised the demographic information of the research respondents, communication climate, job autonomy, employee work passion, and open-ended questions for qualitative insights, and the questionnaire was tailored to the specific context of Malaysian R&D organizations. For instance, the communication climate scale is adapted from Falcione, Sussman & Herden (1992), while the employee work passion scale derives from the Work Passion scale developed by Johri, Misra, and Bhattacharjee (2016). Job autonomy was also measured using a developed and established scale from prior researchers Breaugh, James A. (1985). Moreover, innovative workplace behavior was also measured using a predefined and well-established questionnaire from previous literature (De Jong & Den Hartog, 2010).

3.3 Sampling and Data Collection

The sample for this study comprises researchers employed within Malaysian R&D organizations. Utilizing the table specified by Krejie and Morgan (1970), a sample size of approximately 325 researchers is targeted to ensure statistical robustness and generalizability of findings. Data collection is facilitated through a hybrid approach, combining online surveys and workshops. While participation in the survey is voluntary, top management strongly encourages involvement to maximize response rates. The survey remains accessible

for 21 days, affording respondents ample time to provide comprehensive feedback.

3.4 Ethical Consideration

While conducting this research, the researcher considered all potential ethical vulnerabilities and issues associated with potential research participating individuals. Before collecting responses, respondents were provided with enough pertinent information regarding the motive and scope of the study and any possible risks associated with their responses. In advance, consent for participation was obtained from respondents by clicking the option in the questionnaire. This consent was obtained to ensure the student's understanding of the study questionnaire and other issues. All participants were allowed to withdraw from the research response at any given time based on their own choice. The data was kept confidential and accessible to the researchers only to ensure the privacy of the data collected throughout the response days. No data were kept at the researcher's end to identify the respondents' identity, such as name, ID, contact details, or other personal information. Only the researcher was authorized to access and process the data. During the data collection process, it was certain that no harm should be done to the research participants. Also, no sensitive topics or questions were asked throughout the questionnaire. Overall, this research aimed to accumulate data that can help foster scientific advancement and improve society. This utilized the ethical considerations the American Psychological Association (APA) outlined. By following such comprehensive guidelines, the researcher was able to minimize the possible biases.

3.5 Analysis Technique

The study utilized Structural Equation Modeling (SEM) via SmartPLS4 to analyze the complex interplay between variables and rigorously scrutinize the research hypotheses. SEM offers the advantage of examining multiple relationships and latent constructs simultaneously, providing a comprehensive understanding of the underlying mechanisms influencing innovative work behavior (IWB). The analysis was conducted in two different stages. Initially, the measurement model was tested and established to check the convergent and discriminant validity of the research constructs (Sarstedt et al., 2017). The first stage also reported reliability analysis, as well as the overall Model fit assessment, which is conducted using various fit indices, including chi-square, Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR), ensuring the model's robustness and accuracy. Finally, the proposed structural model was assessed using structural equation modeling through the SMART PLS CB SEM approach (Anderson & Gerbing, 1988; Sarstedt et al., 2017). The unit of analysis for this research was employees working in Malaysian R&D organizations. Employees, irrespective of their genders, were included in this study for questionnaire distribution and response assessment. The selection of the respondents is bias-free and is not limited by any other means.

4. Analysis and Results

In order to prepare and report the demographical data, SPSS Version 22 was utilized.

Furthermore, a covariance-based approach was utilized to measure the measurement model and structural model SMART PLS. Later, moderating assessment is also carried out and reported through the same software.

4.1 Demographic Findings

The demographic information includes respondents' gender, age, year of experience, employment status, and employment group. In this survey, 48% of the respondents were female, and 52% were males. Further, 16% of respondents aged between 20-29, 28% of respondents aged between 30-39, 26% between 40-49, 29% between 50-59, 1% between 60-69. Further, 12% of respondents served less than 2 Years, 25% of respondents served 2-5 Years, 26% of respondents served 6-10 Years, 35% of respondents served 11-15 Years, 9% of respondents served 16-20 Years, and 5% respondents served more than 20 Years. Also, 59% were permanent employees, and 41% were contractual. Finally, 9% of respondents belonged to the post-doctoral research group, 44% belonged to the research scientist group, and 47% came under the category of research office. A summary of the demographic findings is also depicted in Table 4.1.

Table 错误!文档中没有指定样式的文字。.1. Demographic Findings of the Study

Gender	Number of Responses
a. Female	156
b. Male	169
Age group (years)	
a. 20-29	52
b. 30-39	92
c. 40-49	85
d. 50-59	93
e. 60-69	3
Length of service with the company (years)	
a. Less than 2	39
b. 2 – 5	82
c. 6 – 10	85
d. 11 – 15	113
e. 16 – 20	30
f. More than 20	15
Employment Status	
a. Permanent	192

b. Contract	133
Employee Group	
a. Post-Doctoral Researcher	28
b. Research Scientist	143
c. Research Office	154

4.2 Measurement Model Assessment

The measurement model was assessed using a two-step approach. First, the construct reliability and convergent validity were assessed, followed by the convergent validity. Prior researchers recommend using this approach while doing structural equation modeling (Dash & Paul, 2021; Hair et al., 2010; Memon et al., 2017).

4.3 Construct Reliability and Validity

In order to assess the constructs' reliability (internal consistency), Cronbach's alpha was utilized (Nunnally, 1978). Cronbach's alpha measures the internal consistency of the scale, and if the value falls above 0.7, the internal consistency of the scale is utilized. In the case of this study, internal consistency was achieved as all the values were above 0.7. Further, to test the reliability and validity of the scales, the average variance extracted measure was utilized, as recommended by prior researchers (Hu & Bentler, 1999; Sijtsma, 2009). Based on the findings, the values were well above the prescribed threshold, supporting the validity assumption. Overall reliability findings are presented in Table 4.2.

Table 错误!文档中没有指定样式的文字。.2. Constructs Reliability, Composite Reliability, and AVE

Research Constructs	Cronbach's alpha (standardised)	Composite reliability (rho_c)	Average variance extracted (AVE)
Communication Climate	0.943	0.943	0.527
Employee Work Passion	0.919	0.919	0.586
Innovative Work Behavior	0.942	0.942	0.519
Job Autonomy	0.894	0.894	0.548

4.4 Convergent Validity

The convergent validity was assessed using factor loadings (unstandardized, standardized, and cross-loading measures) (Chin, 2010; Joseph F. Hair et al., 2021). This measure evaluates whether the observed variables/indicators converged onto the desired theoretical construct. The relevance of observed variables/indicators with the desired construct shows the attainment of convergent validity. Based on the findings, all the observed variables loaded with significant p values and the estimates >0.70 to their relevant research constructs, exhibiting convergent validity. The convergent validity can be seen in tables 4.3, 4.4, and 4.5.

Table 错误!文档中没有指定样式的文字。.3. Outer loadings (unstandardized)

	Parameter estimates	Standard errors	T values	P values
IWB1 <- IWB	1.000	n/a	n/a	n/a
IWB13 <- IWB	0.944	0.073	13.015	0.000
IWB7 <- IWB	0.959	0.072	13.266	0.000
EWP7 <- EWP	0.999	0.073	13.745	0.000
IWB8 <- IWB	0.982	0.072	13.566	0.000
CC7 <- CC	0.949	0.072	13.246	0.000
CC1 <- CC	0.991	0.074	13.314	0.000
CC13 <- CC	0.976	0.074	13.242	0.000
CC5 <- CC	0.988	0.073	13.550	0.000
JA5 <- JA	0.992	0.072	13.868	0.000
CC4 <- CC	0.964	0.072	13.415	0.000
EWP3 <- EWP	0.969	0.073	13.327	0.000
JA7 <- JA	0.988	0.074	13.391	0.000
IWB11 <- IWB	0.966	0.073	13.172	0.000
CC9 <- CC	1.003	0.074	13.529	0.000
IWB2 <- IWB	1.000	n/a	n/a	n/a
JA2 <- JA	0.976	0.065	15.066	0.000
CC12 <- CC	0.934	0.066	14.073	0.000
IWB15 <- IWB	0.978	0.064	15.252	0.000
IWB9 <- IWB	0.938	0.066	14.233	0.000
JA3 <- JA	0.997	0.065	15.433	0.000
EWP5 <- EWP	0.938	0.067	14.005	0.000
CC3 <- CC	0.972	0.065	15.019	0.000
CC8 <- CC	1.000	n/a	n/a	n/a
IWB4 <- IWB	1.023	0.079	12.895	0.000
IWB12 <- IWB	1.020	0.081	12.639	0.000
EWP6 <- EWP	1.030	0.080	12.805	0.000
CC2 <- CC	1.031	0.080	12.889	0.000
CC15 <- CC	1.048	0.082	12.837	0.000
EWP4 <- EWP	1.025	0.083	12.283	0.000
IWB6 <- IWB	1.025	0.081	12.706	0.000
JA6 <- JA	1.008	0.079	12.695	0.000
IWB5 <- IWB	1.010	0.080	12.646	0.000
IWB3 <- IWB	1.040	0.082	12.620	0.000
EWP1 <- EWP	1.033	0.082	12.667	0.000
EWP2 <- EWP	1.039	0.081	12.766	0.000
CC10 <- CC	1.055	0.081	13.020	0.000
IWB10 <- IWB	1.032	0.080	12.874	0.000

JA1 <- JA	1.000	n/a	n/a	n/a
CC11 <- CC	1.005	0.077	13.095	0.000
CC6 <- CC	0.952	0.077	12.328	0.000
JA4 <- JA	1.014	0.076	13.291	0.000
CC14 <- CC	1.023	0.078	13.102	0.000
EWP8 <- EWP	0.974	0.077	12.616	0.000
IWB14 <- IWB	1.028	0.078	13.207	0.000

Table 错误!文档中没有指定样式的文字。.4. Outer loading (Standardised)

Observed Variables	Outer loadings (standardized)
IWB1 <- IWB	0.717
IWB13 <- IWB	0.728
IWB7 <- IWB	0.725
EWP7 <- EWP	0.731
IWB8 <- IWB	0.737
CC7 <- CC	0.726
CC1 <- CC	0.749
CC13 <- CC	0.732
CC5 <- CC	0.724
JA5 <- JA	0.751
CC4 <- CC	0.748
EWP3 <- EWP	0.739
JA7 <- JA	0.759
IWB11 <- IWB	0.715
CC9 <- CC	0.729
IWB2 <- IWB	0.719
JA2 <- JA	0.751
CC12 <- CC	0.742
IWB15 <- IWB	0.696
IWB9 <- IWB	0.729
JA3 <- JA	0.705
EWP5 <- EWP	0.744
CC3 <- CC	0.729
CC8 <- CC	0.714
IWB4 <- IWB	0.715
IWB12 <- IWB	0.722
EWP6 <- EWP	0.792
CC2 <- CC	0.718

CC15 <- CC	0.719
EWP4 <- EWP	0.782
IWB6 <- IWB	0.717
JA6 <- JA	0.721
IWB5 <- IWB	0.715
IWB3 <- IWB	0.717
EWP1 <- EWP	0.785
EWP2 <- EWP	0.776
CC10 <- CC	0.704
IWB10 <- IWB	0.729
JA1 <- JA	0.736
CC11 <- CC	0.715
CC6 <- CC	0.720
JA4 <- JA	0.758
CC14 <- CC	0.716
EWP8 <- EWP	0.774
IWB14 <- IWB	0.724

Table 错误!文档中没有指定样式的文字。.5. Cross Loadings

Observed Variables	CC	EWP	IWB	JA
CC1	0.749			
CC10	0.704			
CC11	0.715			
CC12	0.742			
CC13	0.732			
CC14	0.716			
CC15	0.719			
CC2	0.718			
CC3	0.729			
CC4	0.748			
CC5	0.724			
CC6	0.720			
CC7	0.726			

CC8	0.714			
CC9	0.729			
EWP1		0.785		
EWP2		0.776		
EWP3		0.739		
EWP4		0.782		
EWP5		0.744		
EWP6		0.792		
EWP7		0.731		
EWP8		0.774		
IWB1			0.717	
IWB10			0.729	
IWB11			0.715	
IWB12			0.722	
IWB13			0.728	
IWB14			0.724	
IWB15			0.696	
IWB2			0.719	
IWB3			0.717	
IWB4			0.715	
IWB5			0.715	
IWB6			0.717	
IWB7			0.725	
IWB8			0.737	
IWB9			0.729	
JA1				0.736
JA2				0.751
JA3				0.705
JA4				0.758
JA5				0.751
JA6				0.721
JA7				0.759

4.5 Discriminant Validity

In contrast to convergent validity, discriminant validity is measured to establish the variable's distinction and uniqueness and assess whether they are homogenous or distinguishable. Through this process, the latent variables that constitute constructs are compared with other variables that are present in the proposed research model. From this perspective, each construct is measuring a unique theoretical perspective; hence, the emergent construct must

be distinguished statistically from its counterparts in the model (Henseler et al., 2016; Henseler et al., 2015; Rönkkö & Cho, 2022). Discriminant validity is attained based on the minimum to no correlation between latent constructs (Hubley, 2014).

While using the structural equation modeling (SEM) technique, two known measures, the Frnell-Larcker criterion and Hetrotrait-Monotrait Ratio (HTMT), are utilized (Fornell & Larcker, 1981). By using such two measures, robustness regarding discriminant validity can be attained. Forner-Larcker measures calculate and compare the correlation coefficient of the variable with its average variance extended value, and the outcome value should be less than the variable's correlation with other constructs (Hair et al., 2014; Henseler et al., 2015). On the other hand, the HTMT ratio is considered acceptable for discriminant validity with values under 0.85 (Hair et al., 2016; Henseler et al., 2016; Henseler et al., 2015). In the case of this research, both values for Fornell-Larcker and HTMT were well aligned with the prescribed limit; hence, discriminant validity was achieved. Moreover, the findings of both requirements are presented in Tables 4.6 and 4.7, respectively.

Table 错误!文档中没有指定样式的文字。.6. Heterotrait-monotrait ratio (HTMT)

Constructs	CC	EWP	IWB	JA
Communication Climate	-			
Employee Work Passion	0.134			
Innovative Work Behavior	0.267	0.241		
Job Autonomy	0.172	0.059	0.253	

Table 错误!文档中没有指定样式的文字。.7. Fornell-Larcker criterion

Constructs	CC	EWP	IWB	JA
Communication Climate	0.726			
Employee Work Passion	0.131	0.766		
Innovative Work Behavior	0.267	0.238	0.720	
Job Autonomy	0.170	0.033	0.256	0.740

4.6 Measurement Model Fit Assessment

In order to measure the quality of measurement and structural models (for our proposed research framework), indices such as GFI= Goodness of a fit index, AGFI= Adjusted goodness of fit index, PGFI= Parsinomy goodness of fit index, SRMR= Standardised root mean square residual, NFI= Normed Fit Index, TLI= Tucker-Lewis Index, CFI= Comparative Fit Index, AIC= Akaike's information criterion, $\chi 2$/degree of freedom, and BIC= Bayesian information criterion were utilized. All of the values for such indicators were well in line with

the predefined limits/criteria (Hu & Bentler, 1999); findings of all such indices are mentioned in tables 4.8 and Figure 4.1

Table 错误!文档中没有指定样式的文字。.8. Measurement Model Fit Assessment

Measures	Estimated model	Null model
Chi-square	1013.053	8997.951
Number of model parameters	96.000	45.000
Number of observations	325.000	n/a
Degrees of freedom	939.000	990.000
ChiSqr/df	1.079	9.089
RMSEA	0.016	0.158
GFI	0.884	n/a
AGFI	0.873	n/a
PGFI	0.802	n/a
SRMR	0.038	n/a
NFI	0.901	n/a
TLI	0.990	n/a
CFI	0.991	n/a
AIC	1205.053	n/a
BIC	1568.301	n/a

Note: “GFI= Goodness of fit index, AGFI= Adjusted goodness of fit index, PGFI= Parsimony goodness of fit index, SRMR= Standardised root mean square residual, NFI= Normed Fit Index, TLI= Tucker-Lewis Index, CFI= Comparative Fit Index, AIC= Akaike's information criterion, BIC= Bayesian information criterion”.

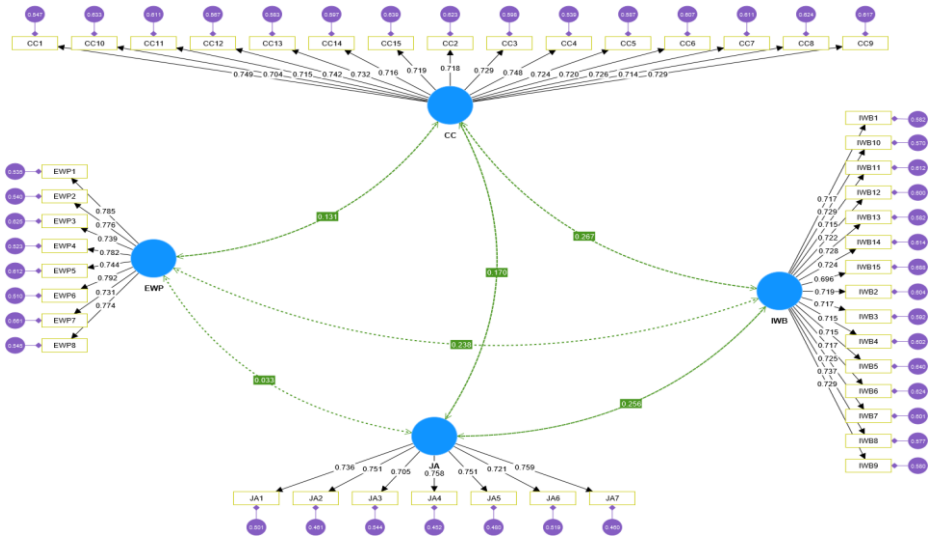


Figure 4.1. Measurement Model

4.7 Hypothesis Testing

Overall, the study assessed five hypotheses, three of which measured the direct relationship and two of which tested the moderation effect. To test the hypotheses under the purview of structural equation modeling, the bootstrapping technique was utilized to assess the direct effect and path coefficients (Henseler et al., 2016; Henseler et al., 2015).

Based on the first hypothesis, a positive impact of job autonomy on innovative work behavior was anticipated. According to the findings, the path coefficient value, $\beta = 0.222$ ($t = 3.429$, $p < 0.000$), supported the proposed relationship, meaning that job autonomy positively impacted innovative work behavior; thereby, the first hypothesis was accepted. Further, according to the second hypothesis, employee work passion is expected to influence innovative work behavior positively. Based on the patch coefficient, $\beta = 0.158$ ($t = 2.317$, $p < 0.011$) supported the hypothesized relationship; thereby, the second hypothesis was accepted, meaning that the employee's work passion will enhance the overall innovative work behavior at work.

Lastly, the direct impact of communication climate on innovative work behavior was measured through the third hypothesis, meaning that the communication climate that is supportive or conducive will positively influence the overall innovative work behavior of employees. According to the statistical findings, $\beta = 0.185$ ($t = 2.073$, $p < 0.020$), the hypothesized relation was supported; hence, communication climate should be considered a positive element for innovative work behavior at work. Path coefficients and their P Values for the hypothesized relationship are mentioned in Table 4.8 and in Figure 4.3 Path Model Estimates.

Table 错误!文档中没有指定样式的文字。.8. Path Model Assessment

Relationship between constructs	Path Value	T statistics (|O/STDEV|)	P values
Communication Climate -> Innovative Work Behavior	0.185	2.073	0.020
Employee work Passion -> Innovative Work Behavior	0.158	2.317	0.011
Job Autonomy -> Innovative Work Behavior	0.222	3.429	0.000

4.8 Moderation Effect Assessment

The study treated communication climate as the potential moderator between employee work passion and innovative work behavior (hypothesis 5) and between job autonomy and innovative work behavior (hypothesis 6). Analysis was conducted to highlight the strength of the moderating effect of communication climate. Based on the prior literature proposition, the moderating variable's existence influences the direct relationship between independent and

dependent variables (Hair et al., 2016; Hair, 2013). The bootstrapping technique was utilized to assess the moderating effect through a robust technique, which helps strengthen the findings by exploring further complex methodology. According to the fourth hypothesis, communication climate will moderate the relationship between job autonomy and innovative work behavior, meaning that if the communication climate is positive and inflated, it will strengthen the positive association between autonomy and innovative behavior. Based on the findings, $\beta = 0.128$ ($t = 2.104$, $p<0.019$), communication positively moderated the relationship between job autonomy and innovative work behaviors; hence, the importance of communication climate seems pivotal to fostering innovative work behaviors at the workplace.

Finally, the fifth hypothesis proposed the moderating role of communication climate between employee work passion and innovative work behaviors, meaning that communication climate is expected to strengthen the association of employee work passion with innovative work behaviors. Based on the findings, $\beta = 0.042$ ($t = 0.805$, $p<0.212$), the hypothesis was not supported due to the fact that the P-value was >0.05, hence making the result insignificant. Overall moderating results are depicted in Table 4.9. Furthermore, the interaction between job autonomy, communication climate, and innovative work behavior is presented in Figure 4.2.

Table 错误!文档中没有指定样式的文字。.6. Moderation effect assessment

Relationship between constructs	Path Value	T statistics (|O/STDEV|)	P values
CCXEWP1 -> Innovative Work Behavior	0.042	0.805	0.212
CCXJA1 -> Innovative Work Behavior	0.128	2.104	0.019

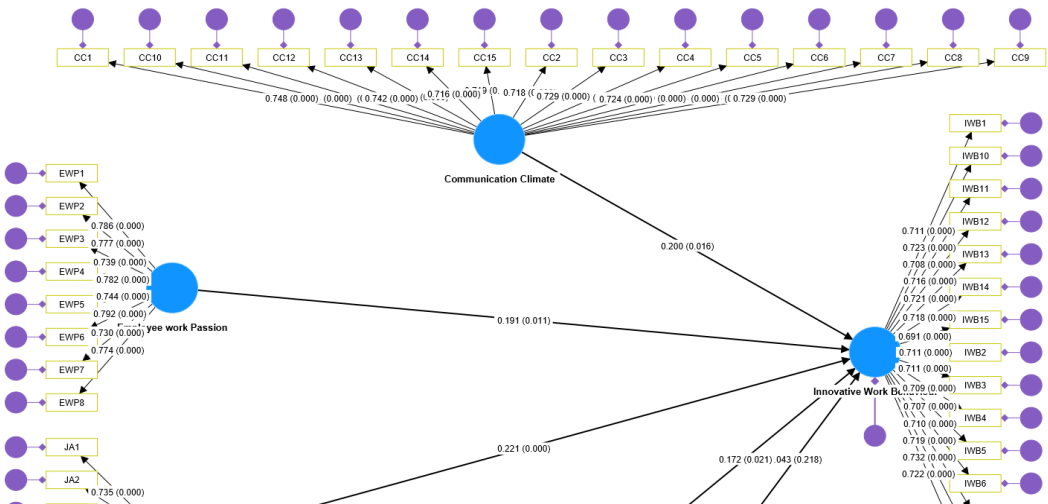
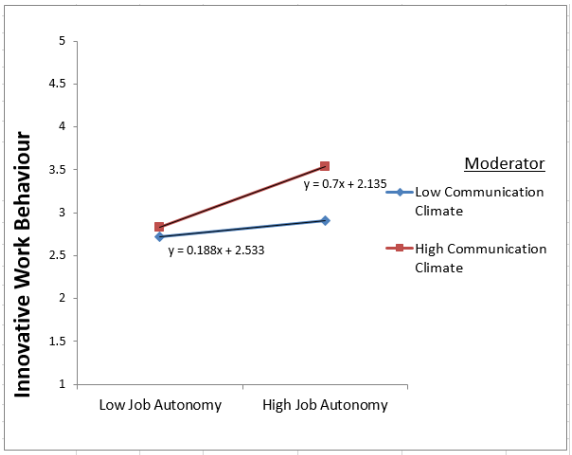


Figure 4.3. Path Model Estimates



Communication Climate strengthens the positive relationship between Job Autonomy and Innovative Work Behaviour.

Figure 错误!文档中没有指定样式的文字。.4. Interaction between Job Autonomy and Communication Climate

5. Discussion and Conclusions

Some multiple factors and elements can be of paramount and utmost importance for research and development organizations to attain an advantage over the competitors and the overall industry to drive business growth and sustainability. Out of a gazillion elements, autonomy for employees (power inferred through discretion and power) is considered significant and essential to fostering innovative work behavior. In the purview of the empirical evidence through research, strengthening the notion that job autonomy positively impacted innovative work behavior in the context of Malaysian organizations highlights this factor's importance for overall organizational effectiveness and performance-related outcomes.

In the context of autonomy at work for an individual, the ability to have freedom with reference to the assigned tasks, i.e., flexibility, scheduling, and means and ends of execution (Breaugh, 1985; Nie et al., 2023). Employees can exert positive outcomes through autonomy,

such as innovation, generating new ideas, going into novel areas, and providing solutions for problems they may face in their defined role. Nonetheless, employees can contribute to organizational productivity through innovative behavior by developing new concepts, providing additional insights, and innovating processes and products in some cases (Al-Shami et al., 2023; Groselj et al., 2021; Renkema et al., 2021; Yang et al., 2019). Through innovative work behaviors, workforces' behaviors, such as their ability to conduct creativity while facing and solving problems and their perseverance to sort for opportunities that support continuous and evolving enhancement for performance.

This research and its empirical evidence provide persuasive evidence for the research and industry community to look for the positive association between job autonomy and innovative work behavior in the Malaysian R&D Organizational contexts. The research findings align with the prior literature supporting this notion in different industrial contexts (Kubicek et al., 2017; Theurer et al., 2018). This study reported a significant and positive impact of job autonomy on workplace innovative behaviors, implying that one's feeling of control over their job may foster innovative behaviors such as providing new ideas, conducting new experiments, sharing their knowledge, and expanding their learning span. From the aforementioned empirical evidence, it can be inferred that employees' feeling that they are given autonomy at work will persuade them to come up with additional efforts at work, providing further insights coupled with enthusiasm for looking after areas of improvement that are not conventional. Consequently, they may change the status quo at the workplace and foster disruptive behaviors that may counter the stagnate elements and bring adaptability and change.

With reference to the Malaysian culture based on collectivism and a strict hierarchical structure, the presence of job autonomy to foster innovative work behavior in the context of an R&D organization is significant. Literature supports this notion that job autonomy may enable innovative work behaviors for individuals, and this research aligns with this idea. Research and development organizations can foster innovative work behaviors by providing discretion and authority to their workforce to enhance their prevailing processes and optimize performance, thereby instilling ownership and dedication, ultimately creating a creative and flexible culture.

For an organization to maintain a competitive edge in the industry and over the competitors, it is crucial to develop and sustain a research and development culture that encourages innovation to counter the ever-changing business landscape. This research endeavor extends support to understanding and comprehending elements that help employees engage in innovative work behaviors. A thorough light has been shed upon the importance of employee work passion, and its criticality for Malaysian research and development organizations to explain how work passion behavior may support a culture at work that is creative and innovative through this discussion.

The literature describes work passion at work for an individual as one's conviction and

association with the work that is intrinsic and is driven by passion and internal motivation, or in other words, an emotional attachment that results in the optimum performance at work(Burke et al., 2015; Johri et al., 2016). Job work passion entails characteristics such as absorption (a feeling of task immersion and concentration while performing a job or tasks), obsessive passion (a continuous and desirable urge to be present and engage in productive activities at work), and harmonious passion (one's internalization of a job and work that they do and identify themselves with that work) (Donahue et al., 2012; St-Louis et al., 2018). On the other hand, innovation at work comprises behaviors such as developing new ideas, conceiving new patterns and procedures, deviating from the status quo, and adapting to processes and procedures that help the organization (Hülsheger et al., 2009). Innovation at the workplace exhibits the demonstration of initiative and exploring behavior of the workforce to counter emerging issues and problems at hand.

Further, prior literature supports this notion that organizations where the workforce works zealously and actively participate in organizational matters, result in an innovative workplace (Alshebami, 2021; Yu, 2019). Based on the literature, it has been observed that workers who exhibited behavior about participation, ideas generation, testing new concepts, and information sharing with conviction with work influenced creativity at work (Alshebami, 2021; Yu, 2019). Employees who are harmonious with the work and job display internal drive and passion to resolve problems and obstacles, ultimately fostering creativity and innovation in their organizations.

Through the research findings, the importance of support from the organization and a work environment that support and environment that cultivates passionate employees and innovation in their processes is emphasized. According to prior literature, productivity engagement and innovation can be attained by organizational measures such as the prioritization of employee wellbeing, equipping employees with relevant skills, and providing them with pertinent information timely, and this may also lead to a culture of innovation and autonomy coupled with ownership (Amabile, 1996; Amabile, 1998). In summary, organizations can have a more significant look at the elements that boost internal motivation and can strengthen the work passion of their workforce to maximize their performance potential, hence ultimately driving their continuous performance improvement innovations along with the competitive edge in the industry and market.

Communication is of the utmost importance for organizations to survive in today's era, and effective communication strategies help support workplace collaboration, knowledge and skills sharing, and creativity among employees. An environment that is characterized by elements such as openness, consistent flow of information, and transparency in practices can significantly enhance innovation and creativity at work (Krohn, 1981; Lancaster, 1985). Through this discussion section, the importance of workplace communication climate for generating innovative workplace behavior is highlighted in the context of Malaysian research and development organizations.

Communication climate can be referred to as an environment where prevailing norms, workers' attitudes, and communication-related practices are followed in an organization (Kvalnes, 2023). A positive communication climate entails characteristics such as ease of sharing information, organization's receptivity to feedback and inputs, addressing the employee's concerns, listening to their views and opinions, and welcoming their ideas by providing them comfort and ease (Barbato et al., 2003; van den Hooff & de Ridder, 2004). In an environment that is comprised of a positive communication climate, employees may feel trust among themselves, they may feel respected along with psychological safety, and they may also observe organizational facilitating behavior while collaborating and knowledge sharing (Detert & Edmondson, 2011). On the other hand, organizational growth and competitiveness can be achieved through innovative behavior such as creativity, adapting and implementing new ideas, and enhancing prevailing processes and products alongside the generation and development of new novel procedures (Amabile, 1996; Amabile et al., 2002). Nonetheless, organizational innovation is driven by employees' collective protectiveness and their engagement in adapting to innovative and creative problem-solving behavior.

Based on the prior literature, there is a compelling argument supporting the notion that a positive communication climate fosters innovative work behavior for organizations that ultimately helps them attain and sustain an advantage in terms of productivity over their competitors and the industry in general. Based on the prior seminar literature, there is a significant and positive impact of a positive communication climate on individual performance and probability to exhibit behaviors that reflect innovation and creativity at work through their collective efforts for collaboration, idea sharing, and generation, as well as supporting and understanding each other's task and roles (Ruliana et al., 2018). It is anticipated that a culture of innovation and creativity will be fostered in organizations that support openness and transparency in communication. They give their employee trust and psychological safety to do such activities, which will help them groove and achieve innovation in their processes and products.

Moreover, in the context of research and development organization, the research finding highlights the importance of organizational leadership and the prevailing culture in steering and enhancing the communication climate that is necessary for creating an environment that is full of creativity. It is pertinent to mention here that the role of a leader is characterized as an individual who listens to his followers carefully, is genuine with them, his employees feel safe around him, and can speak without fear of any repercussions; his role becomes more relevant to foster positive communication climate (Detert & Burris, 2007). Likewise, from the organizational perspective, innovation and creativity can be fueled through a positive communication climate that strengthens and supports cross-functional communication, encourages behaviors that address problem-solving, and also supports norms and practices that positively influence information sharing throughout the organization (Carmeli, 2007; Carmeli et al., 2008).

From the organizational psychology perspective, the exploration of the interaction between an individual's job autonomy and the positive communication climate is of the utmost importance. From the standpoint of an individual, the degree of power and independence conferred on one's role while performing tasks is known as job autonomy. On the other hand, communication climate encompasses the prevailing atmosphere and communication mood (quality and quantity of communication) throughout the organization.

The study findings suggest that a communication environment (positive communication climate) that is open and supportive for the employees can influence the impact of job autonomy over their workplace innovation behavior. This means that a higher positive communication climate will further strengthen the relationship between job autonomy and innovative behavior at work. Keeping in view of this finding, it makes sense to say that if the workforce is feeling empowered to exchange their thoughts freely, discuss their inner feelings, and communicate without any hesitation and reluctance, they may leverage their autonomy to show more engagement and activity towards initiating innovative job-related behaviors. Search findings of this study also support the theoretical physics propositions of social exchange theory that posits dispositive interaction between workplace factors such as trust reciprocity and a sense of belonging with the work-related outcomes (Cropanzano et al., 2017; Redmond, 2015). When employees feel confident through a positive communication climate, they may enhance their innovative behavior through their job autonomy, which reflects a case of social exchange in this case.

Out of many possibilities, one of the possible reasons for such findings could be the elements that are fostered and catered through a positive organizational climate where organizational members are given with ease to exchange their ideas and thoughts and interns are made sure that they will not face any repercussion which gives them psychological safety to speak up for any scenario. Such an environment fosters risk-taking behavior, and through job autonomy, search behaviors will help in problem-solving and implementing solutions to cater to the problems that are at hand or are anticipated.

Further, the research has also supported this idea that knowledge creation feedback loops and the facilitation of information sharing also foster innovation at work, which are often the result of communication strategies such as open-door communication ban channels, regular team interactions, and regular opportunities for collaboration for the employees (Alcalay, 1983). From this perspective, it is justified to state that if employees feel autonomous with respect to their work and responsibilities and are equipped with information that is easily accessible and on time, it will help them utilize those autonomous behaviors in the pursuit of innovation at work.

According to the prior literature, the relationship between autonomy and innovative behavior is strengthened or facilitated by the communication climate where creativity innovation initiation and idea generation are fostered. Also, an environment that is equipped with trust, mutual respect, and constructive feedback is provided. It is most likely to encourage

employees to take the initiative and go beyond the regular call of duty, meaning that they can do their job in an old-fashioned or regular way. Still, when they are equipped with a positive communication climate accompanied by enough autonomy in their role, they may like to enhance or alter their task accomplishment (De Clercq & Belausteguigoitia, 2017; Peng et al., 2021; Zhang & Bartol, 2010).

From the practical standpoint, for an organization to stand out, the development of an environment that is conducive to innovation can be attained through establishing a positive communication climate with enough job autonomy for its workforce, which will lead them to initiate behavior that can alter the course of development for the organization. In doing so, the role of leadership is of utmost importance, as it can ensure transparency throughout the communication processes as well as for the job designing and decision-making processes. Managers and the workforce should be trained to enhance innovative work behavior and to understand and alter the communication climate that is suited to their production requirements or workplace environment. That is suited to their production requirement or workplace environment.

Unexpectedly and in contrast to the previous scenario where communication climate positively moderated between job autonomy and innovative work behavior, the communication climate had a non-significant statistical impact on employee work passion and their creative work behavior. The findings were against the hypothesized relationship between variables. Search study findings seem counterintuitive due to the fact that climate communication autonomy and innovation are at different levels in different organizational contexts, meaning that the interplay between these variables is complex and is expected to be different in multiple organizations.

There could be several reasons associated with such findings. Still, out of many explanations, one possible could be the organizational culture, the design of job structure, the communication channel present in the organization, and the employee's characteristics such as experience, position role, and responsibility nature may have overshadowed or damped the moderating role of communication climate between employee work passion and innovative work behaviors. From the theoretical point of view, the impact of the employee's work passion on innovative work behavior could be contingent upon the employee's internal motivation and drive to be creative at work. Since the communication climate is a complex construct that may have further multifaceted ideas within this construct, the major that the study has utilized may not have captured the entire complexity of the concept that is relevant to innovation at the workplace. Elements such as openness, clarity, the responsiveness of the leadership, trust, and psychological safety encompass the positive communication climate, and they may have a different direct effect individually on innovative work behaviors depending upon the different organizational context that needs further explanation.

Since the moderating role of communication climate was insignificant, this means that the direct association between communication climate and innovation innovative work behavior

could be more effective, meaning that communication climate stand-alone can contribute positively to faster innovative work behavior disseminating behaviors such as collaboration sharing of information and solving problem through collective learning and development.

In conclusion, from the organizational perspective, the prevailing communication climate, job autonomy, and employee work passion are expected to enhance innovative work behaviors positively. If employees feel a positive communication climate, they may leverage their autonomy to adopt more innovative work behaviors. On the contrary, the hostile communication climate is expected to dampen the positive effect of job autonomy and employee work passion, and vice-versa. It is also important to note that communication climate itself is a direct predictor of an innovative work environment, and its moderating role for employee work passion is insignificant in the context of this research, which requires further exploration.

5.1 Suggestions for Future Research

To build on our findings, future studies could combine quantitative analysis with qualitative methods like interviews or focus groups. This would give us a deeper understanding of the underlying mechanisms driving innovative work behavior and how organizational dynamics come into play. Longitudinal studies tracking these relationships over time could also provide valuable insights. By observing how these factors evolve in response to changes in the organizational environment, we can better understand the causal relationships between them.

Comparative studies across different industries or cultural contexts could further enrich our understanding. By examining how these relationships vary across diverse settings, we can uncover universal principles as well as context-specific factors that influence innovative work behavior. In summary, by exploring these factors in greater depth and considering a broader range of contextual influences, future research can help organizations foster creativity and innovation among their employees more effectively.

5.2 Conclusion and Recommendations

Considering the challenges posed by the Fourth Industrial Revolution (IR4.0), maintaining competitiveness in R&D organizations hinges upon fostering a culture of continuous innovation. This study underscores the pivotal role of a positive communication climate, high levels of job autonomy, and robust employee work passion in driving innovative behavior within organizations. This research contributes to the theoretical understanding of organizational behavior and innovation dynamics by elucidating these relationships.

Our study aimed to investigate the relationships between communication climate, job autonomy, employee work passion, and innovative work behavior (IWB) within Malaysian R&D organizations. We found compelling evidence supporting the positive associations between each of these factors and IWB. Specifically, conducive communication climates,

increased job autonomy, and heightened employee work passion were all significantly correlated with greater levels of innovative behavior among employees.

Furthermore, our findings suggest that these relationships are nuanced and multifaceted. For example, the positive impact of job autonomy on IWB may be influenced by organizational culture or leadership styles. Similarly, the relationship between communication climate and IWB may vary depending on contextual factors within the organization. Understanding these nuances is crucial for developing targeted strategies to foster innovation effectively.

5.3 Research Limitations

It is essential to acknowledge the limitations of our study, which may restrict the generalizability of our findings. The data collected was specific to Malaysian R&D organizations, and cultural or contextual factors may influence the relationships observed. Additionally, our study employed a cross-sectional design, limiting our ability to infer causality. Future research could address these limitations by conducting comparative studies across different industries or cultural contexts and employing longitudinal designs to track changes over time.

In conclusion, by delving into the complex interplay between communication climate, job autonomy, employee work passion, and innovative work behavior, our study provides valuable insights that can inform organizational strategies and drive innovation in the ever-evolving landscape of R&D organizations.

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Authors contributions

Sample: Ms. Nisya, Mr. Shoaib were responsible for study design, revising and data collection. Dr Rohani Salleh overlook the manuscript and revisions t. All authors read and approved the final manuscript.

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Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Informed consent

Obtained.

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The Publication Ethics Committee of the Macrothink Institute.

The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

Provenance and peer review

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Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

Open access

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