

Exploring the Relationship Between Flexible Work Arrangements, Employee Engagement, and Innovative Work Behavior in Shenzhen's IT Information Technology Industry

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Abstract: The rapid growth of the Information Technology (IT) industry in Shenzhen, China, has intensified the need for continuous innovation to maintain competitive advantage. Flexible work arrangements and employee engagement have emerged as potential drivers of innovative work behavior, especially in high-demand sectors like IT. This study aims to explore the combined impact of FWAs and employee engagement on IWB within Shenzhen's IT industry, with a focus on understanding how employee engagement mediates the relationship between flexible work options and innovation. Using a quantitative research design, data were collected from 400 IT professionals in Shenzhen through a structured questionnaire, and analyzed using Structural Equation Modeling (SEM). The findings indicate that FWAs have a direct positive effect on IWB, while also indirectly fostering innovation by enhancing employee engagement. Additionally, the mediation analysis reveals that employee engagement significantly amplifies the impact of FWAs on innovative work behavior. This study contributes to the literature by providing empirical evidence on the dual pathway through which FWAs influence innovation, suggesting that companies can enhance their innovative capabilities by implementing flexible work policies that also prioritize employee engagement. These insights are valuable for HR practices and management strategies in the IT sector, highlighting the strategic benefits of fostering both flexibility and engagement to drive innovation.

Keywords: Flexible work arrangements, employee engagement, innovative work behavior, IT information technology industry, Shenzhen city

1. Introduction

The rapid advancement of digital technologies has transformed industries around the world, and nowhere is this transformation more evident than in the Information Technology (IT) sector (Taherdoost, 2023). Shenzhen, often referred to as China's "Silicon Valley", has emerged as a leading hub for technological innovation, housing many of China's prominent IT companies (Du, 2020). The city's rise is largely attributed to its open policies, robust infrastructure, and a unique culture of innovation and entrepreneurship (Yang & Garzik, 2022). However, as competition in the IT industry intensifies, companies are increasingly under pressure to maintain their competitive advantage by fostering innovation (Wang et al., 2020). Innovative work behavior (IWB), actions by employees that lead to the creation, promotion, and implementation of new ideas, has become critical for sustaining organizational success in such a fast-paced environment (Akhter et al., 2022).

Flexible work arrangements (FWA) have gained attention as a strategic tool to enhance employee satisfaction and productivity. With the COVID-19 pandemic acting as a catalyst, remote work, flexible hours, and hybrid models have become widely adopted in the IT sector (Tao et al., 2024). Flexible work arrangements not only offer employees the autonomy to manage their work-life balance but also provide companies with an opportunity to foster an environment

that encourages creative thinking and innovation (Indrayanti, 2024). Recent studies indicate that FWA can positively impact employee engagement by empowering employees, thus potentially influencing their innovative behavior (Jiang et al., 2023). However, the extent to which flexible work arrangements contribute to fostering innovative work behavior in the IT industry remains an underexplored area in academic literature, especially in the context of China.

Employee engagement is another critical factor for driving innovative work behavior. Engaged employees are generally more committed, motivated, and invested in the success of their organization (Clack, 2021). High levels of engagement have been linked to increased creativity, higher productivity, and enhanced problem-solving capabilities, all of which are essential for innovation (Al-Ajlouni, 2021). In the IT industry, where rapid technological changes require continuous adaptation and learning, engaged employees are more likely to contribute to innovative solutions (Manafe et al., 2024). In Shenzhen, where the IT industry is characterized by a high demand for agility and rapid development cycles, understanding the relationship between employee engagement and innovative work behavior is essential for organizations aiming to maintain their market leadership.

The IT industry in Shenzhen operates in a highly competitive and dynamic environment, where continuous innovation is vital for organizational survival and success. Companies in this industry are facing growing pressures to not only attract and retain top talent but also to foster an environment conducive to innovation. While flexible work arrangements have been widely adopted, especially post-pandemic, there is still a lack of understanding regarding how these arrangements affect employees' propensity to engage in innovative work behavior. Similarly, while employee engagement is acknowledged as a driver of productivity and creativity, the specific ways it interacts with flexible work arrangements to influence innovation in Shenzhen's IT industry remain unclear.

The traditional hierarchical work culture in many Chinese organizations may impact how flexible work arrangements are perceived and implemented. As flexible work options become more common in Shenzhen's IT sector, there is a critical need to assess whether these arrangements truly foster innovation or if they pose challenges that could potentially hinder creativity. This gap in understanding hinders the ability of IT companies to leverage flexible work practices effectively. Moreover, while employee engagement has been extensively studied, its impact on innovative behavior in the context of flexible work settings within the Chinese IT sector has not been adequately explored. Therefore, the core problem this study addresses is the limited understanding of how flexible work arrangements and employee engagement interact to drive innovative work behavior in Shenzhen's IT industry.

While previous research has examined the individual impacts of flexible work arrangements and employee engagement on organizational outcomes, there is limited empirical evidence on their combined influence on innovative work behavior, particularly in the IT industry in China. Furthermore, existing studies often focus on Western contexts, with little attention given to the unique socio-cultural and economic dynamics of China's rapidly evolving tech industry. To address this gap, the study aims to examine the combined effects of flexible work arrangements and employee engagement on innovative work behavior in the IT industry of Shenzhen. This research will provide insights into how flexible work practices and employee engagement can be harnessed to foster innovation in a highly competitive and dynamic sector.

2. Literature Review

2.1 Studies on Flexible Work Arrangements and Innovative Work Behavior

The relationship between flexible work arrangements and innovative work behavior has garnered significant attention in recent years, with multiple studies highlighting the positive impact of flexible working conditions on employees' capacity to innovate.

Astriani & Muafi (2023) found that employees who were afforded flexible work schedules demonstrated higher levels of creative thinking and problem-solving capabilities. According to the study, FWAs provide employees with the autonomy to manage their time effectively, which reduces stress and allows for a better work-life balance. This balance, in turn, fosters a psychological environment where employees feel motivated to explore novel ideas and take creative risks without the constraints of rigid working hours. The study also argued that the sense of control granted by flexible scheduling enhances employees' intrinsic motivation, which is a critical driver of innovative behavior. The findings suggest that when employees have the freedom to choose their work hours, they are more likely to engage in proactive behaviors, experimenting with new approaches to their tasks and contributing fresh ideas to the organization.

Qi et al. (2023) supports the notion that FWAs contribute positively to innovative work behavior by promoting greater autonomy and self-direction. The study conducted a quantitative analysis across various work settings and found a statistically significant correlation between the implementation of FWAs and the increase in employees' innovative outputs. The study emphasized that employees with flexible working arrangements tend to experience a higher sense of ownership over their tasks, which encourages them to think beyond conventional methods and actively seek creative solutions to work-related challenges. The study highlighted that when employees are not bound by strict schedules or confined to traditional office environments, they are more likely to enter a "flow state", a mental state that has been associated with heightened creativity and innovation. This freedom not only allows employees to work during their peak productivity hours but also enables them to engage in deeper, more focused thought processes that are conducive to generating novel ideas and approaches, thus driving innovation within the organization.

Indrayanti (2024) also provided empirical evidence supporting the positive influence of flexible work arrangements on innovative work behavior. The study explored the psychological impact of flexible working conditions on employees and found that FWAs foster a work environment where employees feel trusted and valued by their employers. This sense of trust leads to increased job satisfaction and psychological safety, which are essential for encouraging innovative behaviors. The study argued that when employees perceive that their organization supports their individual needs through flexible arrangements, they feel a stronger commitment to the organization and are more willing to invest in activities that contribute to organizational growth, including innovation. Furthermore, the study found that FWAs reduce the likelihood of burnout, as employees can work in a manner that aligns with their personal needs and preferences. This reduction in stress and exhaustion further enhances their cognitive resources, enabling them to engage in innovative thinking. Consequently, the study concluded that flexible work arrangements not only improve overall employee well-being but also create a fertile environment for innovative work behavior to flourish.

These studies have underscored the positive correlation between flexible work arrangements (FWAs) and innovative work behavior. Research indicates that FWAs enhance employees' creative thinking and problem-solving abilities by providing them with autonomy over their schedules, thereby fostering a better work-life balance and reducing stress.

2.2 Studies on Flexible Work Arrangements and Employee Engagement

The relationship between flexible work arrangements and employee engagement has been the subject of extensive research in recent years, as organizations increasingly recognize the potential benefits of offering employee's greater autonomy over their work schedules and locations.

Weideman & Hofmeyr (2020) explored the effects of flexible work arrangements on employee engagement, finding a clear and positive correlation between the two. The research focuses on variables directly related to flexible work options, such as remote work and flexible hours, and their impact on engagement metrics like enthusiasm, dedication, and focus. The study found that employees with access to flexible work options reported significantly higher levels of engagement than those without such options. The study suggests that this increase in engagement stems from the greater autonomy and control flexible work arrangements provide, allowing employees to better balance work and personal commitments. By enabling employees to manage their schedules and work environments in ways that suit their individual needs, organizations can foster a more engaged workforce. The study concludes that offering flexible work arrangements is not only a perk but a strategic tool for enhancing employee engagement, as it empowers employees to work more efficiently and with greater motivation.

Botrel Vilela (2021) examined how flexible work arrangements influence employee engagement and focusing exclusively on employees who transitioned from traditional office-based schedules to flexible work arrangements. The results demonstrated a substantial increase in employee engagement following the introduction of flexible work options. The study attributed this rise in engagement to the improved work-life balance that flexible work arrangements facilitated. Employees reported feeling less stressed and more energized, which translated into higher engagement levels. The study also noted that flexible work arrangements gave employees a greater sense of control over their work environment, which fostered a deeper commitment to their roles. The study argues that flexible work policies can serve as a powerful engagement strategy, as they enhance employees' sense of autonomy and reduce burnout, ultimately resulting in a more dedicated and motivated workforce.

Yeaman (2021) focused on understanding the psychological mechanisms through which flexible work arrangements positively impact employee engagement. The research employed a mixed-methods approach, combining survey data with in-depth interviews to explore employees' experiences with flexible work options and their perceived levels of engagement. The findings indicated that flexible work arrangements significantly boost employee engagement by fostering a sense of empowerment and reducing workplace stress. The study found that employees who were allowed to set their own hours and work remotely felt a stronger connection to their organization and expressed higher levels of engagement. This increase in engagement was largely attributed to the psychological benefits associated with flexibility, such as a heightened sense of trust from the organization and an improved ability to balance personal and professional responsibilities. The study concludes that flexible work arrangements do more than just accommodate employees' schedules, they create a work environment in which employees feel valued, respected, and more committed to their roles. By enabling employees to work in ways that align with their personal needs, flexible work arrangements encourage a higher level of engagement, ultimately benefiting both employees and the organization.

Recent studies have shown a strong positive correlation between flexible work arrangements and employee engagement. These studies argue that flexible work arrangements empower employees through greater autonomy and trust, leading to increased enthusiasm, focus, and dedication. This not only benefits individual employees by allowing them to manage personal and professional commitments more effectively but also serves as a strategic tool for organizations to foster a more committed and productive workforce.

2.3 Studies on Employee Engagement and Innovative Work Behavior

Employee engagement has been studied as a factor that promotes innovative work behavior, defined as the intentional creation, introduction, and application of new ideas within a work role, group, or organization. Research consistently highlights the significant and positive role of employee engagement in fostering employees' innovative capacities, as

engaged employees tend to be more committed, enthusiastic, and willing to go beyond their formal job responsibilities to explore new ideas and contribute creatively to their work environments.

Ali et al. (2022) investigated the impact of employee engagement on innovative work behavior and found that higher levels of engagement were associated with an increase in employees' willingness to engage in creative problem-solving and idea generation. The study measured employee engagement through dimensions such as vigor, dedication, and absorption, finding that each of these aspects contributed positively to innovative behavior. Employees who reported higher levels of vigor, a component of engagement characterized by high levels of energy and resilience, were more likely to exhibit innovative work behaviors, as they were more willing to persist in developing and implementing new ideas, even in the face of challenges. Additionally, dedication, or a sense of meaningful involvement and pride in one's work, was linked to greater creative output, as engaged employees were more motivated to see their ideas through to completion. The study concluded that engagement fosters an intrinsic motivation in employees that propels them to actively seek out and develop innovative solutions, thus reinforcing the notion that engaged employees are crucial to sustaining a culture of innovation within organizations.

Sari et al. (2021) conducted a quantitative study exploring the relationship between employee engagement and innovative work behavior, emphasizing the motivational aspects of engagement that inspire creativity. Their research highlighted that engaged employees tend to display a proactive mindset, characterized by a strong sense of ownership over their work and a willingness to experiment with new ideas without direct managerial prompting. The study applied structural equation modeling to establish that employee engagement had a statistically significant positive effect on innovative work behavior. One of the key findings was that engagement enhances employees' intrinsic motivation, which is often a critical driver of innovation, as employees feel psychologically safe and supported to take risks and propose new ideas. The study argued that when employees are engaged, they are not only more invested in their own job performance but also in the overall success of the organization, making them more likely to contribute creative solutions that can improve processes, products, or services. The study concluded that fostering engagement among employees can serve as an effective strategy for organizations aiming to boost innovative capabilities.

Koroglu & Ozmen (2022) further corroborated the positive impact of employee engagement on innovative work behavior, focusing on the cognitive and emotional engagement that enables employees to approach tasks with a creative mindset. The study assessed how sustained levels of engagement over time influence employees' capacity to generate and implement new ideas. The results indicated that employees who were consistently engaged displayed higher levels of cognitive flexibility, enabling them to think outside traditional frameworks and develop novel approaches to problem-solving. Furthermore, the emotional investment that characterizes engaged employees was shown to enhance their commitment to innovation, as these individuals were more likely to persist in refining their ideas and overcoming obstacles in the innovation process. The study concluded that employee engagement acts as a catalyst for innovative work behavior by encouraging a mindset that is open to new possibilities and resilient in the face of setbacks. According to the study, fostering employee engagement can therefore play a crucial role in enhancing an organization's capacity for innovation by empowering employees to take initiative and develop creative solutions.

In summary, these studies affirm that employee engagement is a significant driver of innovative work behavior. Engaged employees are more likely to demonstrate a proactive approach, resilience in idea development, and a strong intrinsic motivation that encourages creativity and innovation. By fostering a culture of engagement, organizations can effectively promote innovative work behaviors among their employees, contributing to continuous improvement and competitiveness in today's dynamic work environments.

3. Research Methodology

3.1 Research Design

This study adopts a quantitative research method to investigate the relationships between flexible work arrangements, employee engagement, and innovative work behavior in the IT industry in Shenzhen. A quantitative approach is suited for this research because it allows for the collection and analysis of numerical data that can be used to measure the variables of interest objectively. By using statistical tools, quantitative research enables the researcher to establish patterns, test hypotheses, and make generalizable conclusions about the population under study (Creswell, 2014). Given that this study seeks to examine the extent to which flexible work arrangements and employee engagement influence innovative work behavior, a quantitative approach provides a structured and reliable framework for quantifying these relationships.

Moreover, the quantitative research method allows for a high degree of precision and replicability, which are essential for academic rigor and the validity of the findings. In contrast to qualitative methods, which may offer rich descriptive insights but are limited in terms of generalizability, the quantitative approach is well-suited for identifying statistically significant relationships that can apply to the broader IT workforce in Shenzhen. By focusing on measurable constructs such as engagement levels, flexibility in work arrangements, and innovative behaviors, this study can draw meaningful inferences that contribute to both theory and practice.

The rationale for selecting a quantitative research method is rooted in the objectives of this study, which aims to

empirically validate the hypothesized relationships between flexible work arrangements, employee engagement, and innovative work behavior. Quantitative methods are especially valuable in contexts where the goal is to test theoretical models and assess causal relationships. In this case, structural equation modeling is used to examine the pathways through which flexible work arrangements and employee engagement influence innovative work behavior. SEM is a robust statistical technique that enables the simultaneous examination of multiple relationships between variables, making it particularly appropriate for complex, multi-variable studies. Additionally, the quantitative approach aligns with the study's objective of producing findings that can inform HR practices and managerial policies within the IT sector. By quantifying the effects of flexible work arrangements and engagement on innovation, the study provides actionable insights that IT companies in Shenzhen can apply to foster a more innovative work culture. The results, therefore, have practical relevance for industry stakeholders, allowing them to make evidence-based decisions that promote employee well-being and drive innovation.

According to the research process in Fig. 1, the study explores the relationship between flexible work arrangements, employee engagement and innovative work behavior in Shenzhen’s IT information technology industry.

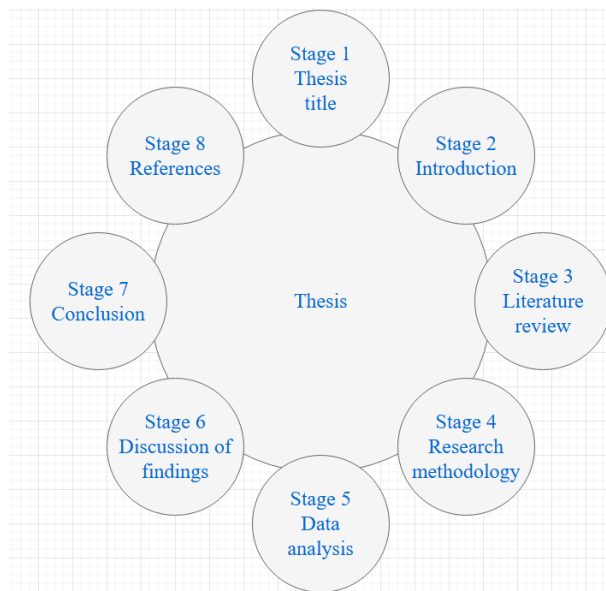


Figure 1. Flow of process

3.2 Sample Selection and Size Determination

The sample for this study is drawn from the IT industry workforce in Shenzhen, which, according to the 2023 IT Services Industry Research Report and data from "Yicai" (formerly known as First Financial), comprises approximately 702,500 employees. Given the large size of the population, a representative sample is essential to ensure that the findings can be generalized to the broader workforce. Utilizing the Raosoft sample size calculator, which considers factors such as the desired confidence level, margin of error, and population size, the study determined that a minimum sample size of 384 participants would be statistically sufficient for accurate analysis. To enhance the robustness of the study, a target sample size of 400 IT professionals was selected.

A random sampling method is used to ensure that each member of the IT workforce in Shenzhen has an equal opportunity to be included in the study. Random sampling minimizes the risk of sampling bias, thus enhancing the representativeness of the sample and the validity of the findings. This approach is particularly important in a diverse field like IT, where factors such as job roles, experience levels, and organizational culture may vary significantly. By adopting a random sampling method, the study seeks to capture a cross-section of the IT workforce in Shenzhen, thus ensuring that the insights derived from the research reflect the experiences and perspectives of a broad range of employees within the industry.

After distributing 400 questionnaires among the research participants in the IT industry workforce in Shenzhen for a month from October 17 to November 17, 2024, the study retrieved 394 completed responses. To ensure the validity and reliability of the data, 4 questionnaires were excluded due to incompleteness or errors, resulting in 390 valid questionnaires for analysis.

3.3 Data collection

The study utilizes a structured questionnaire with Likert-scale items to collect data from respondents. The Likert-scale format, specifically a 5-point scale ranging from “Strongly Disagree” to “Strongly Agree”, is adopted for its ability to capture the intensity of respondents’ attitudes and perceptions related to flexible work arrangements, employee

engagement, and innovative work behavior. This scaling method is commonly used in social science research due to its simplicity and effectiveness in measuring latent variables such as employee attitudes and behavioral intentions.

The items in the questionnaire are adapted and designed from validated scales developed by previous scholars. Using pre-validated items helps to ensure the reliability and validity of the measurement instruments, as these items have been rigorously tested in prior studies. The questionnaire is pre-tested with a small group of IT professionals to identify and address any issues related to clarity or ambiguity in the wording of items, thus enhancing the quality of the data collected.

3.4 Data Analysis Techniques

The study employs a two-pronged data analysis approach, utilizing descriptive statistics and Structural Equation Modeling (SEM) to analyze the collected data. First, descriptive statistics are used to provide an overview of the sample characteristics and the distribution of responses. Measures such as means, standard deviations, and frequency distributions are calculated to summarize respondents' perceptions of flexible work arrangements, levels of engagement, and tendencies toward innovative work behavior. Descriptive statistics offer an initial understanding of the data and help in identifying any potential patterns or anomalies within the sample.

The primary analysis technique employed in this study is SEM, which is used to test the hypothesized relationships between flexible work arrangements, employee engagement, and innovative work behavior. SEM is suited for this study as it allows for the simultaneous examination of multiple pathways, providing a comprehensive view of how the independent variables (flexible work arrangements and employee engagement) interact to influence the dependent variable (innovative work behavior). SEM not only provides estimates of the strength and direction of relationships but also assesses the overall fit of the theoretical model to the observed data, thereby validating the proposed conceptual framework.

4. Data analysis

The study applied Structural Equation Modeling to explore the interactions between the three principal latent variables identified in the research, including flexible work arrangements, employee engagement and innovative work behavior. The results of SEM are presented in Fig. 2.

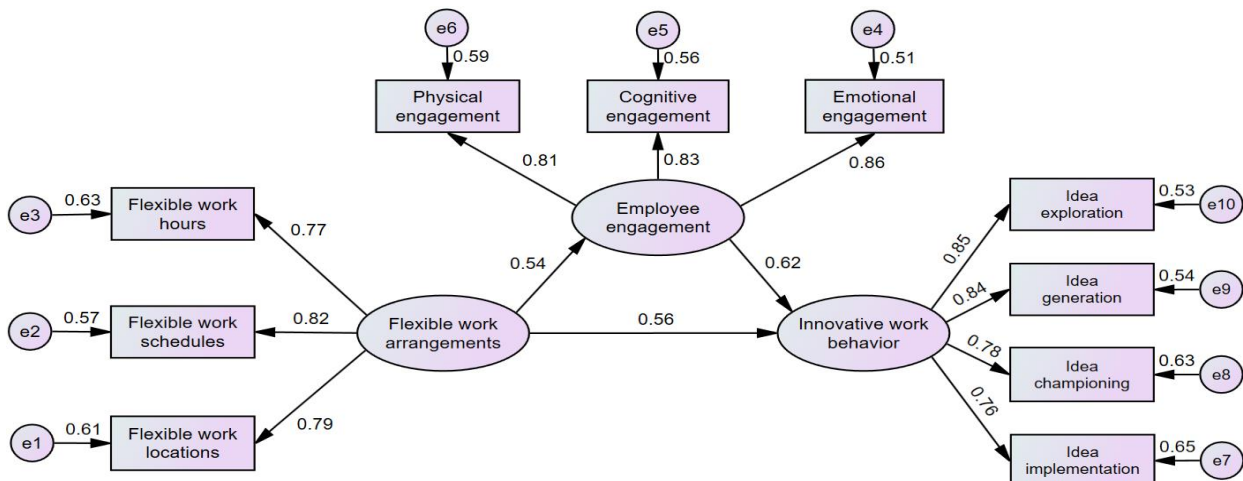


Figure 2. Structural equation modeling results

The results from the path analysis, illustrated in Fig. 3, demonstrate a significant relationship between flexible work arrangements and innovative work behavior. Specifically, the standardized path coefficient is recorded at 0.562, with a statistical significance level of $P < 0.001$. This substantial positive coefficient indicates that employees who engage in flexible work arrangements are more likely to exhibit innovative work behaviors.

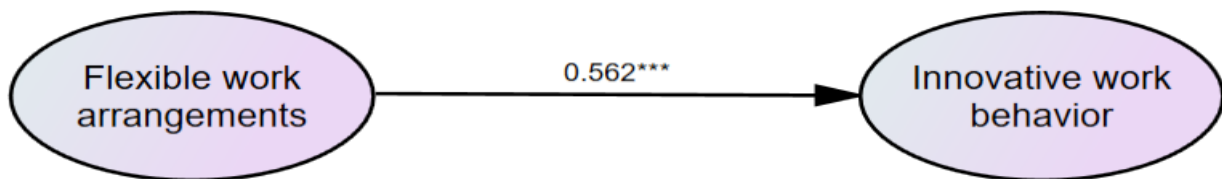


Figure 3. Path analysis between flexible work arrangements and innovative work behavior

The path analysis, detailed in Fig. 4, clearly demonstrates a robust positive relationship between flexible work arrangements and employee engagement. The analysis yielded a standardized path coefficient of 0.538, which is highly significant with a P-value of less than 0.001. This strong positive coefficient underscores the substantial impact that flexible work arrangements have on enhancing employee engagement.

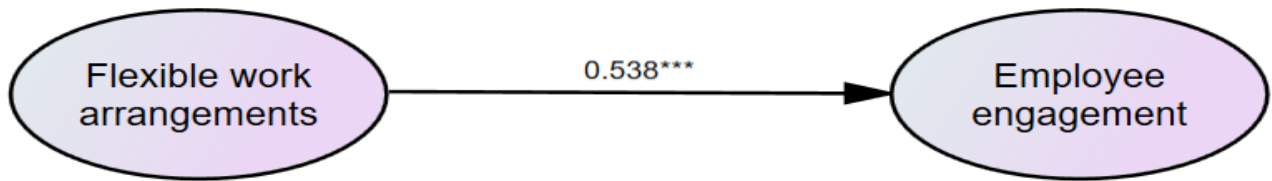


Figure 4. Path analysis between flexible work arrangements and employee engagement

The path analysis depicted in Figure 5 provides statistical evidence supporting a strong positive linkage between employee engagement and innovative work behavior. The analysis shows a standardized path coefficient of 0.617, with a highly significant P-value of less than 0.001, suggesting that higher levels of employee engagement lead directly to increases in innovative work behavior.

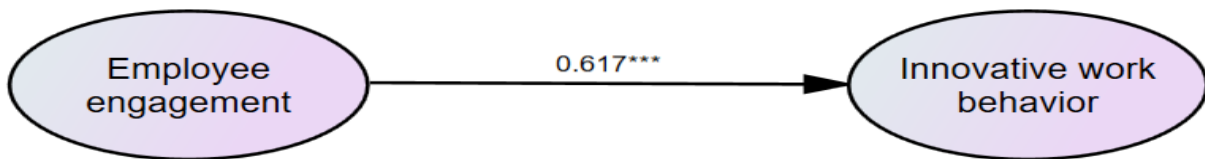


Figure 5. Path analysis between employee engagement and innovative work behavior

Besides, the study focuses on exploring the impact of flexible work arrangements on innovative work behavior, while also examining the role of employee engagement as a mediator in this relationship. To assess the mediation effect, the study utilized the Bootstrap method, conducting 5,000 resamples to ensure the statistical robustness of the research results, following the guidelines suggested by Chernick & LaBudde (2014). This approach helps in confirming the presence and strength of the indirect effects within the proposed model of the study.

Table 1. Mediating effect of employee engagement

Standard effect	Path	Effect coefficient	95% confidence interval		S.E.	P-value
			Lower	Upper		
Total effect	Flexible work arrangements--->Innovative work behavior	0.894	0.843	0.945	0.026	***
Direct effect	Flexible work arrangements--->Innovative work behavior	0.562	0.517	0.607	0.023	***
Indirect effect	Flexible work arrangements--->Employee engagement--->Innovative work behavior	0.332	0.291	0.373	0.021	***

The total effect of flexible work arrangements on innovative work behavior, as indicated by an effect coefficient of 0.894 ($P < 0.001$), is significant and substantial. This suggests that flexible work arrangements, when considered as a single independent factor, have a strong positive impact on innovative work behavior. In other words, employees who benefit from flexible work arrangements are generally more likely to engage in behaviors that foster innovation, such as generating new ideas, experimenting with creative approaches, and implementing novel solutions.

The direct effect of flexible work arrangements on innovative work behavior is reduced to 0.562 ($P < 0.001$). This lower direct effect compared to the total effect suggests that some of the impact of flexible work arrangements on innovative work behavior operates through employee engagement. This finding implies that flexible work arrangements may not solely enhance innovation directly, but also do so by boosting employee engagement, which in turn promotes innovative behaviors.

The indirect effect of flexible work arrangements on innovative work behavior through employee engagement is also significant, with an effect coefficient of 0.332 ($P < 0.001$). This indirect effect supports the hypothesis that employee engagement mediates the relationship between flexible work arrangements and innovative work behavior. The positive indirect effect indicates that flexible work arrangements increase employee engagement, and this heightened engagement then facilitates innovative work behavior. In other words, flexible work arrangements contribute to an environment where employees feel more engaged, motivated, and committed, which subsequently enhances their willingness and ability to

innovate.

In summary, the mediation analysis highlights that employee engagement is a crucial mechanism through which flexible work arrangements influence innovative work behavior. Flexible work arrangements alone have a direct positive effect on innovation, but their impact is amplified when they also lead to higher levels of employee engagement. This finding suggests that IT companies in Shenzhen can foster a more innovative workforce by implementing flexible work policies that not only improve work-life balance but also actively engage employees. Through this dual pathway, organizations can maximize the benefits of flexible work arrangements in driving innovation.

5. Discussion of Findings

This study examined the influence of flexible work arrangements and employee engagement on innovative work behavior within Shenzhen's IT industry, with a particular focus on understanding how these variables interact. The results reveal that flexible work arrangements significantly enhance innovative work behavior, both directly and indirectly, by boosting employee engagement.

The path analysis results show a statistically significant positive relationship between flexible work arrangements and innovative work behavior, with a standardized path coefficient of 0.562 ($p < 0.001$). This finding aligns with prior research that underscores the role of flexible work arrangements in fostering environments that promote creativity and innovation. Studies by Rahman et al. (2020) found similar effects, noting that when employees have control over their schedules, they are more likely to engage in behaviors conducive to innovation. By allowing employees autonomy over their time and work settings, FWAs reduce the rigidity of traditional work structures, thereby enhancing employees' creative thinking and problem-solving abilities. In Shenzhen's competitive IT industry, where rapid innovation is critical, the ability to cultivate such a psychological environment is valuable. FWAs provide employees with the flexibility to work during their most productive hours. When employees have the freedom to manage their work in alignment with their personal productivity cycles, they are more likely to engage in high-quality innovative work, ultimately benefiting the organization's competitive advantage.

The study found a strong positive relationship between flexible work arrangements and employee engagement, with a standardized path coefficient of 0.538 ($p < 0.001$). This aligns with findings from Ali (2019), who reported that FWAs contribute to increased employee engagement by enhancing autonomy and reducing stress. Flexible work arrangements allow employees to balance their professional and personal responsibilities more effectively, reducing burnout and fostering a sense of control over their work environment. This increased autonomy creates a psychological sense of ownership, which is crucial for engagement. In Shenzhen's IT industry, characterized by high demands and fast-paced development cycles, flexible work arrangements provide a necessary buffer against stress and exhaustion. By offering employees control over their work settings and schedules, organizations not only address work-life balance concerns but also create an environment that makes employees feel valued and trusted. This sense of trust is essential for fostering engagement. When employees perceive that their organization cares about their well-being and offers them flexibility, they are more likely to develop a strong commitment to their roles, leading to increased engagement and willingness to contribute to organizational goals.

The findings also reveal a significant positive relationship between employee engagement and innovative work behavior, with a standardized path coefficient of 0.617 ($p < 0.001$). This is consistent with previous studies, such as those by Vithayaporn & Ashton (2019), which demonstrated that engaged employees are more likely to exhibit behaviors that contribute to innovation. Engaged employees tend to show higher levels of energy, dedication, and absorption in their work, all of which are critical for creative problem-solving and idea generation. In high-demand sectors like IT, where constant innovation is essential, engagement provides employees with the intrinsic motivation needed to persist in developing and implementing new ideas, even in the face of challenges. This proactive mindset, fueled by high engagement, aligns with the needs of Shenzhen's IT companies, which require continuous adaptation and agility. Engaged employees not only fulfill their job requirements but also go beyond to explore new ideas, which is essential for keeping up with rapid technological advancements in the industry. The findings of this study confirm that employee engagement serves as a critical driver of innovation, providing IT firms in Shenzhen with a strategic pathway to foster a culture that encourages and rewards creativity.

The study found the mediating role of employee engagement in the relationship between flexible work arrangements and innovative work behavior. The mediation analysis, supported by the Bootstrap method, revealed a substantial indirect effect of FWAs on IWB through employee engagement, with an effect coefficient of 0.332 ($p < 0.001$). This finding suggests that while FWAs independently promote innovative work behavior, their impact is amplified when they also enhance employee engagement. In other words, flexible work arrangements create a fertile ground for innovation not only by granting employees autonomy but also by fostering a sense of engagement that propels them to take ownership of their creative contributions. This mediated relationship aligns with the theoretical framework proposed by Kelliher and Anderson (2010), who argued that FWAs positively influence employee engagement by providing a sense of psychological empowerment, which in turn leads to higher levels of innovative behavior. When employees are engaged, they are more likely to feel committed to the organization's success and are thus motivated to contribute innovative ideas. This finding is particularly relevant in the context of Shenzhen's IT industry, where companies are striving to stay ahead in a rapidly evolving market. By implementing flexible work policies that also enhance engagement, IT firms can foster

a dual pathway to innovation, leveraging both the direct effects of autonomy and the indirect effects of engagement to cultivate a more innovative workforce.

6. Conclusion

This study provides valuable insights into the role of flexible work arrangements and employee engagement in fostering innovative work behavior within Shenzhen's IT industry. The findings confirm that FWAs significantly enhance IWB both directly and indirectly by increasing employee engagement. By granting employees autonomy over their work schedules and environments, FWAs reduce stress and improve work-life balance, creating a psychological climate that encourages creativity and proactive problem-solving. Additionally, the study reveals that employee engagement acts as a crucial mediator in this relationship. Engaged employees, empowered by flexible work conditions, are more likely to invest in innovative tasks and go beyond their formal job responsibilities to contribute new ideas. This dual pathway, where FWAs not only directly encourage innovation but also enhance employee engagement, which in turn promotes IWB, suggests that IT companies in Shenzhen can maximize their innovative potential by adopting flexible work policies that prioritize both autonomy and employee well-being. The findings underscore the strategic value of FWAs in competitive, fast-paced environments, where maintaining a culture of continuous innovation is essential. By fostering both engagement and autonomy, companies can create a work environment that not only supports employee satisfaction but also drives the creative output needed to sustain competitive advantage. These insights are relevant for HR practices and management policies in the IT sector, suggesting that an integrated approach to flexible work arrangements and employee engagement can be a powerful driver of innovation, allowing organizations to thrive in today's dynamic market landscape.

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