

Article

Double-Edged Sword Effect of Flexible Work Arrangements on Employee Innovation Performance: From the Demands–Resources–Individual Effects Perspective

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Abstract: This study explores the double-edged sword effect of FWAs on employee innovation performance based on the Demand–Resource–Individual Effect (DRIVE) model. A total of 411 valid questionnaires from knowledge-based employees were collected in three stages through a survey of technology-based companies in China. The data were analyzed using SPSS 25.0 and AMOS 22 software, and multi-level linear model analysis was conducted to test the double mediating effect of psychological empowerment and role ambiguity and the moderating effect of role breadth self-efficacy. This study found that, in terms of the job demand path, flexible work arrangements (FWAs) increased employees' role ambiguity, which in turn decreased their innovation performance; in terms of the job resource path, FWAs increased employees' psychological empowerment, which in turn increased their innovation performance. From the perspective of individual differences, under the flexible work system, employees with high role breadth self-efficacy can enhance their psychological empowerment and reduce role ambiguity, thus promoting their innovation performance. This study is the first to analyze the “double-edged sword” effect of FWAs on employee innovation performance based on the DRIVE model, which effectively extends the moderating variable of role breadth self-efficacy in the model and helps to understand the impact of different types of FWAs on employee innovation performance. In addition, this study provides a reference for technology-based companies to strengthen their digital capabilities and regulation of FWAs, which is conducive to achieving sustainable business development.

Keywords: flexible work arrangements; employee innovation performance; psychological empowerment; role ambiguity; role breadth self-efficacy; the Demands–Resources–Individual Effects model



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1. Introduction

The digital age has had a considerable impact on the traditional way of working. The development of the Internet, the widespread use of mobile devices, and the rise of social media all play important roles in modern society's work. Compared to traditional working methods, flexible working approaches offer greater flexibility, sustainability, and convenience and will bring about significant changes. In addition, the COVID-19 outbreak has given impetus to using digital technology for flexible working [1]. Businesses have widely used flexible work arrangements (FWAs) to attract, motivate, and retain critical knowledge-based talent in this context [2]. With the advent of the post-epidemic era, FWAs play an essential role in practice.

Flexible work arrangements have been interpreted as organizational policies or plans that influence when, where, and how long employees engage in work-related tasks [3]. Flexible work arrangements are often considered a win–win management practice for both the organization and its employees. Scholars in this field have had many valuable discussions about FWAs. They have argued that FWAs have the potential to improve employees'

work attitudes and behavioral outcomes [4], which can help improve employees' perceived work autonomy, job satisfaction, organizational commitment, and performance [5–7]. In addition, some studies have shown that FWAs are conducive to promoting employees' innovative behaviors [8]. The positive impact of FWAs on employee innovation performance mainly manifests through the mediating effects of psychological empowerment [9], top management team support [10], work–life balance [11], and job satisfaction [12].

Flexible work arrangements provide the organization with better sustainability while presenting considerable opportunities and challenges to its employees. Some studies have shown that FWAs also have a “dark side”. Flexible working practices and changing workplaces lead to role ambiguity for employees [13], bring a larger workload and more responsibilities [14], and increase work–family conflicts and turnover intentions [8]. In addition, remote communication is more likely to cause employees' emotional exhaustion, leading to a decrease in work enthusiasm and engagement [15]. Reviewing the existing research found that the impact of FWAs on employees is a very complex and controversial topic [16]. It affects employees' work attitudes, work behaviors, physical and mental status, career development, etc. Flexible work arrangements are considered a challenge to traditional corporate philosophy. These studies provide valuable insights for a more comprehensive understanding of the double-edged sword effect of FWAs. However, there are still some issues worth exploring.

First, existing research has focused on separately exploring the positive and negative effects of FWAs, leading to inconsistent findings in some studies and a lack of integrated analysis and comparative studies on the impact paths of the two different effects. Employee performance and FWAs have a solid positive relationship [17]. Flexible work arrangements increase the possibility of cross-functional cooperation, expand the heterogeneous knowledge exchange within the team, and improve the sense of self-efficacy among organization members, which is conducive to stimulating the creativity of employees [18]. However, compared with traditional working methods, online communication in FWAs can easily lead to information asymmetry, resulting in role ambiguity and higher coordination costs. Employees need to make more efforts to obtain innovation support from the organization, so their willingness to innovate will be weaker [19], negatively impacting work efficiency and innovation performance [20]. Negative impacts may stem from role ambiguity and stress caused by leaders implementing FWAs and decentralization. Studies also showed that FWAs are not associated with job performance [21]. The relationship between FWAs and innovation performance is controversial and even contradictory. One of the reasons for this contradictory explanation may be that different scholars have different measurement methods for performance [22]. However, no empirical research has yet to directly examine the mechanism between FWAs and innovation performance. Although most scholars found that FWAs promote the innovation performance of employees, could there be some negative appendages through mediating mechanisms that weaken the positive impact of FWAs? To study the double-edged sword effect of FWAs more systematically, it is necessary to explore the dual-path mechanism of the “enablement path” and “burden path” of FWAs based on a unified theory.

Secondly, the research perspectives of different theories and the differential performance and impact paths of different types of FWAs are also directions worthy of attention in this field. Work time flexibility can help employees build role boundaries and alleviate work–family conflicts [23]. However, workplace flexibility, such as telecommuting, blurs the physical boundaries of work and family roles, resulting in role ambiguity [24]. It shows that different types of FWAs will have different performances on employees, and the impact paths will be different. It is worth mentioning that the research based on this perspective is mostly based on boundary theory [25]. Therefore, it is necessary to explore the two-dimensional structure of FWAs from different theoretical perspectives [26]. Based on the DRIVE model, FWAs, a sustainable form of work, can be both a valuable job resource and a negative job demand [27]. Therefore, this study has theoretical value in exploring the

double-edged sword effect of FWAs on innovation performance from the perspective of workplace flexibility and work time flexibility.

Finally, the current research on the mediating mechanism of FWAs and their moderating variables must be clarified, which requires further consideration and exploration. Although the overall positive relationship between FWAs and employee attitudes, behaviors, job performance, and other variables has been verified by many studies, the current research on the mediation mechanism and boundary conditions of FWAs is insufficient [5]. In addition, the sustainability of FWAs in the Chinese context for organizations and employees still needs to be further explored. The potential factors impacting FWAs need to be explored in combination with the actual situation of Chinese employees. In order to further explore the mechanism of FWAs, the Demands–Resources–Individual Effects (DRIVE) model was used as the theoretical framework in this study. It provides a new framework for explaining the double-edged sword effect of FWAs.

To fill the research gap mentioned above, based on the Demands–Resources–Individual Effects (DRIVE) model, the study aims to answer a fundamental research question: through which paths do flexible work arrangements and the innovative performance of knowledge-based employees interact to accomplish challenging tasks and achieve sustainability? First, we analyze the process mechanism of the double-edged sword effect of FWAs on employee innovation performance. Secondly, we explore the differential performance of FWAs from the perspectives of working time flexibility and workplace flexibility and stimulate employee innovation performance. Third, we explore the mediating role of psychological empowerment and role ambiguity and the moderating role of role breadth self-efficacy in the “double-edged sword” mechanism of FWAs on employee innovation performance. This study has significant theoretical value and practical significance for studying the double-edged sword effect of FWAs on changes in innovation performance.

The remaining parts of this study are arranged as follows. Section 2 is dedicated to the literature review and hypothesis development and constructs the basic theoretical model. In this part, we conducted a large amount of literature sorting and analysis to ensure the breadth and depth of the research. Section 3 describes the research methods in detail. In this part, we adopted the authority scale of the existing literature and adopted the multi-time data collection method to ensure the validity of the data. Section 4 sets out the empirical results of the study. In this part, we analyzed the results of data collection and verified the mediating effect and moderating effect through reliability, validity test, common method bias test, and regression analysis. Next, in Section 5, the discussion and implications have been presented. In this part, we discuss the key findings and theoretical contributions and make suggestions in practice. In the end, the research conclusions are drawn in Section 6.

2. Literature Review and Hypothesis Development

2.1. Literature Review

The development of Internet technology has made it possible to implement flexible work arrangements, which have been more widely used in technology-based companies. However, it is controversial whether flexible work arrangements can improve the innovation performance of knowledge-based employees. Based on the Demands–Resources–Individual Effects (DRIVE) model, we investigate the effects of demand paths, resource paths, and individual differences of flexible work arrangements on employee innovation performance.

2.1.1. The Demands–Resources–Individual Effects (DRIVE) Model

Articles applying the DRIVE model cover a wide range of topics that can be summarized as follows: workplace adversity, burnout, technology stress, change management, supervision, safety climate, mindfulness, etc. The original DRIVE model included variables that might influence the perception of stress but have subsequently been developed into an enhanced DRIVE model [27]. In the enhanced DRIVE model, perceived job stress plays a mediating role between job demands and behavioral outcomes [28]. The model explains the

key variables that may influence behavioral outcomes and incorporates the Conservation of Resources Theory into this interactive model, providing an appropriate framework for studying work-related stress and behavioral outcomes.

Flexible work arrangements are a work characteristic whose double-edged effect on employee innovation performance can be explored by drawing on the DRIVE model. The DRIVE model is a comprehensive and flexible theory. It integrates the combined effects of various work demands, work resources, and personal resources on individual health, behavioral outcomes, organizational outcomes, and other outcome variables [13,27,28]. Flexible work arrangements are seen as job demands, making employees isolated from their leaders and colleagues in time and space, prone to information lag as well as incomplete information transfer, and causing depletion of individual resources [29]. Under such circumstances, employees may feel stressed about job goals, tasks, and other work requirements and develop a sense of ambiguity about role expectations, which is not conducive to improved innovation performance. On the contrary, FWAs can also be regarded as job resources that provide employees with the power to schedule work tasks freely, and employees can autonomously decide when, where, how, and who to work with according to actual needs, facing less social pressure [6]. We also utilized a variable closely related to personal characteristic resources: role breadth self-efficacy (RBSE). On the one hand, employees with high RBSE have more personal resources and are more likely to break out of their established roles to perform integrative tasks, and they perceive themselves as capable of using their job resources to accomplish more challenging tasks [30]. On the other hand, those with low RBSE tend to be less motivated because they are less confident in their own abilities and do not believe they are capable of performing tasks that go beyond the established requirements [31]. We attempted to explore the moderating effect of RBSE, which can mitigate the resource depletion effect (reduce role ambiguity) and enhance the resource gain effect (improve psychological empowerment). As the saying goes, “One person’s trash is another man’s treasure”. We further explore the double-edged sword effect of FWAs on employee innovation performance based on the DRIVE model.

2.1.2. Flexible Work Arrangements

Flexible work arrangements are defined as an organizational policy that promotes employee autonomy in deciding when and where to complete work tasks [32], usually based on the “time” and/or “place” of work. In particular, the concept of “when” to work has been referred to in the literature as flex-time or work time flexibility, which refers to the ability of employees to adjust their work schedules to varying degrees according to their own needs [33]. Telecommuting is an example of workplace flexibility, defined as the use of modern information and communication technologies to work outside the employer’s premises [34], allowing employees to perform their duties outside the organization’s physical boundaries.

Flexible work arrangements provide employees with a greater degree of control over where and when the organization allows employees to perform their work tasks, leading to potential improvements in job satisfaction [35], autonomy [36], performance [37], and organizational identification. However, the literature suggests that both work time flexibility and workplace flexibility may have positive or negative outcomes [38]. As some studies have shown, new resources such as FWAs may alleviate work overload [39]. The potential reduction in work overload after the implementation of work time flexibility implies that work time flexibility has a positive impact on employees’ psychological well-being [32]. In the case of teleworking, the literature shows mixed results. As the level of telecommuting increases, leading to minimal psychological separation from work, it can reduce well-being [40]. Some researchers, however, did not find a significant effect of teleworking on job satisfaction, but found that the effect on work–life balance was usually negative [41]. Based on the current changes in work styles, researchers have also conducted studies related to the interaction of these two types of FWAs [33]. Therefore,

further evidence of the role of FWAs as a demand or resource and the mechanism of its double-edged effect is appropriate.

2.1.3. Psychological Empowerment

Psychological empowerment is defined as an individual's perception of external power and is a positive psychological process of work motivation and role orientation that can be divided into four dimensions: competence, meaning, self-determination, and impact [42]. Psychologically empowered employees are characterized by dedication and flexibility and work towards accomplishing tasks, motivating and inspiring their job roles [43]. Psychologically empowered employees accept additional roles and responsibilities and become more autonomous, which is a major marker of management sustainability and customer satisfaction [44]. In summary, psychological empowerment is not an organizational intervention or personality characteristic but a cognitive state achieved when individuals perceive that they are empowered.

A central proposition of psychological empowerment is that the experience of empowerment and intrinsic motivation will be associated with positive forms of job performance because psychologically empowered employees will adopt a more positive orientation toward their work. Psychological empowerment as an intrinsic and sustained work motivation not only enhances job satisfaction [45], increases organizational commitment [46], and improves job performance [47], but it acts as a disincentive to burnout [48]. It strongly suggests that more empowered individuals are more likely to be engaged in their work and will increase productivity and efficiency. Therefore, we consider psychological empowerment as an important mediating variable in the "empowerment" path of the double-edged sword effect of FWAs, providing a new perspective on the psychological aspects of employees to explain the double-edged sword effect.

2.1.4. Role Ambiguity

Role ambiguity is defined as when individuals lack a clear understanding of the expectations or regulations of a given role and cannot clarify the role's tasks through information communication [49]. Role ambiguity occurs when employees lack information about role expectations, the means to achieve general role expectations, and the consequences of role performance [50].

As research progresses, more and more evidence supports the adverse effects of role ambiguity [51,52], with some researchers arguing that role ambiguity is entirely negative [53]. Role ambiguity has become increasingly common due to the increase in telecommuting due to the COVID-19 pandemic. Role ambiguity can be triggered by uncertainty in the objective environment, cross-border management, and institutional distance. When employees are faced with job demands like role ambiguity and are unable to improve their sense of control over their work through their own learning, they tend to fall into chronic anxiety or stressful mental states, which can negatively affect job outcomes, such as leading to lower job performance [54] and job satisfaction [55], triggering burnout [56] and even turnover tendency [57]. Therefore, we use role ambiguity as a mediating variable in the "burden" path of the double-edged effect of FWAs and explore its consequences on employee behavior.

2.1.5. Employee Innovation Performance

Innovation, as the most important source for firms to improve their competitive advantage, is the cornerstone of achieving sustainable development [58]. In exploring innovation, Janssen and Van Yperen (2004) constructed a new concept, innovation performance, based on an individual performance model that combines innovation and performance [59]. From the research object, innovation performance can be divided into organizational innovation performance, team innovation performance, and employee innovation performance [60]. Employees are the main body of innovation, and the improvement and optimization of their innovation performance can bring about the overall improvement of team and or-

ganizational innovation performance. Therefore, we take knowledge-based employees as the research object to study employee innovation performance from a small-scale perspective. The definition of employee innovation performance can be categorized into three types. The first is innovation outcome-oriented, which considers employee innovation performance to emphasize the perceptible, measurable, and valuable innovation results that result from employees' new ideas [61]. The second is innovation process-oriented, which considers employee innovation performance as the process by which employees generate and promote innovative ideas and implement innovative behaviors in their job roles, work teams, or organizations [59]. The third orientation, on the other hand, integrates innovation outcomes and processes and considers employee innovation performance as the process by which employees generate novel and creative ideas and implement them to achieve innovative outcomes to achieve performance goals [62]. Therefore, we define employee innovation performance as reflecting the outcome of innovation, including the whole process of innovation activities.

It was found that the improvement of employee innovation performance is not only driven by the external incentives of the company but also depends on the intrinsic psychological motivation of the employees. Only when employees actively translate perceived external resources into actual innovative actions, such as efforts to create, introduce, and apply new ideas, will they eventually present innovative outcomes and improve innovation performance [59,63]. Therefore, based on the basic hypothesis of the DRIVE model and previous research results, we can regard FWAs as work resources or work demands and analyze their double-edged sword effect on innovation performance from the "empowering" and "burdening" paths.

2.1.6. Role Breadth Self-Efficacy

The concept of self-efficacy was first developed by Bandura (1977) as "a person's belief (or confidence) in his or her motivation, cognitive resources, and ability to perform a given task successfully in a given environment" [64]. Parker (1998) extended it to the field of proactive behavior research by introducing the concept of role breadth self-efficacy [65]. The construct focuses more on employee initiative and the breadth of work tasks. Role breadth self-efficacy (RBSE) is a positive personal psychological resource defined as employees' perceptions of their ability to perform a broader and more proactive set of work tasks beyond the prescribed technical requirements [30]. It describes the degree of confidence in performing a wider range of extra-role behaviors and is a specific form of self-efficacy [66].

RBSE reflects the motivational state of "can do" and is a significant predictor of positive behavior [67]. Once these employees with high RBSE decide to take the initiative, they become intrinsically motivated and try to meaningfully change themselves and make some contribution to the organization [68]. As Zapata-Phelan et al. (2009) demonstrated, intrinsic motivation can lead employees to perform their tasks better [69]. Studies have shown that RBSE helps to improve employees' performance [70], proactive behavior [71], and innovative behavior [72] because it influences both the activities that people pursue and the effort they put into those activities. Therefore, role breadth self-efficacy as a moderating variable is of great significance for understanding employees' behavioral performance and innovation performance.

2.2. Hypothesis Development

2.2.1. Flexible Work Arrangements and Psychological Empowerment

The organizational environment may influence perceptions of psychological empowerment, particularly through empowering HRM practices and leadership [43,73]. There is evidence that FWAs, when implemented under appropriate conditions, can positively affect employees' cognitive state [74]. Flexible work arrangements can be divided into workplace flexibility and work time flexibility [75]. To maximize the positive impact of implementing both types of FWAs, according to the DRIVE model and the Conservation of Resources Theory, the organization must be able to identify and balance work requirements

and work resources. For example, when implementing telecommuting, organizations can provide employees with resources such as high control and job autonomy and adjust work demands such as high workloads as a way to improve employees' cognition of psychological empowerment [73]. Workplace flexibility can enhance employees' status, which can boost their positive cognitive effect and improve their psychological empowerment [76]. It has also been shown that remote work experience is positively related to self-efficacy [77]. Self-efficacy as an intrinsic motivation can improve employees' perceptions of psychological empowerment. Furthermore, according to the DRIVE model [27], workplace flexibility can be considered a job resource that significantly and positively affects psychological empowerment [73]. Work time flexibility can be achieved based on formal or informal organizational practices [78]. When employees feel supported and encouraged by their organizations to manage non-work demands or challenges at work, such as when organizations give employees work time flexibility to care for children or family members, they are more likely to put forth greater effort in developing skills and personal effectiveness to manage their work and non-work demands and responsibilities, which increases their well-being [79] and also has a positive impact on their perception of psychological empowerment.

In summary, FWAs enhance employees' perception of individual resource acquisition, increase psychological empowerment, and create a resource-enrichment spiral for the acquisition and preservation of individual resources. Therefore, based on the DRIVE model and the Conservation of Resources Theory, we consider flexibility as a valuable work resource that enriches individual resources—psychological empowerment—by providing individuals with the sense of control and autonomy needed to satisfy both work and family domains. Based on the results of previous studies, we propose the following two hypotheses:

Hypothesis 1a (H1a). *Workplace flexibility has a positive effect on the psychological empowerment of knowledge-based employees.*

Hypothesis 1b (H1b). *Work time flexibility has a positive effect on the psychological empowerment of knowledge-based employees.*

2.2.2. Flexible Work Arrangements and Role Ambiguity

Flexible work arrangements may have different impacts on work, depending on their implementation [38]. Workplace flexibility requires employees to fulfill multiple personal and work roles simultaneously [80]. Spatial isolation due to limited mobility and physical space reduces opportunities for face-to-face communication with colleagues or leaders, resulting in less frequent interactions, which in turn increases employees' social isolation [81] and does not help employees develop an accurate understanding of their roles. Telecommuting blurs the boundaries between work and home and may lead to role ambiguity as it may be associated with overtime [75].

Implementing different types of FWAs involves changes in work demands and resources based on the DRIVE model, which requires in-depth research [33]. The high job demands of FWAs, such as innovative outcomes and higher performance standards, may cause employees to develop a perception of individual resource loss, creating role ambiguity and a resource loss spiral [82]. According to the Conservation of Resources Theory, role ambiguity occurs precisely because one role undertaken by an individual takes up or even consumes the resources needed for another role. While the individual's resources, such as time, are limited, conflict or stress occurs when the required resources are consumed. Therefore, workplace flexibility and work time flexibility can be understood as work demands that potentially increase employee-perceived stress or inhibit personal resources. Considering the postulates of the DRIVE model and the previous empirical evidence, we propose the following hypotheses.

Hypothesis 2a (H2a). *Workplace flexibility has a positive impact on the role ambiguity of knowledge-based employees.*

Hypothesis 2b (H2b). *Work time flexibility has a positive impact on the role ambiguity of knowledge-based employees.*

2.2.3. The Mediating Role of Psychological Empowerment

Psychological empowerment is considered to be one of the most influential factors affecting employees' innovative behavior [83]. The literature has identified a positive relationship between psychological empowerment and individual performance outcomes, such as job satisfaction [84], task performance [85], and job performance [86]. Psychological empowerment has also been shown to affect creativity [87], innovative behaviors [88], and employee career success [89]. When individuals have the corresponding perception of psychological empowerment, they will actively construct work roles, explore hidden values, promote innovation to become their internal pursuit, and increase innovative behavior [90]. Based on the DRIVE model, individuals will use psychological empowerment as an emotional resource and strive to acquire, maintain, and protect it. Psychological empowerment makes employees willing to take responsibility [91]. They work proactively, boldly, and creatively. Employees' enthusiasm for innovation is thus fully stimulated at work [92]. Psychological empowerment is a psychological state that increases employees' intrinsic motivation for work. Employees with higher psychological empowerment are more willing to absorb knowledge, which further improves their innovation performance. The literature provides strong empirical support for the relationship between psychological empowerment and innovative outcomes.

The improvement in employee psychological empowerment indicates that employees' basic internal needs (autonomy, competency, and belonging) have been satisfied [93]. When the external environment provides sufficient support, such as when the organization gives employees a certain amount of work flexibility, the internal needs of employees are satisfied, which will affect the psychological empowerment of employees. According to the assumptions of the DRIVE model and the Conservation of Resources Theory, when employees have more work-related resources, their level of psychological empowerment increases, and they strive to acquire, maintain, and protect such resources [94]. Psychologically empowered employees can make active use of work resources (flexible work arrangements) so that employees are willing to take responsibility [91], the completion of team/group tasks is increased, and employees' enthusiasm for innovation are fully stimulated at work [92].

Our arguments for the mediating role of psychological empowerment are based on the DRIVE model [28]. Flexible work arrangements are work-promoting strategies that, if properly applied, can serve as work resources. Flexible work arrangements increase employee engagement and psychological empowerment, reduce workload, and can effectively improve employee performance [80]. Thus, psychological empowerment plays an important mediating role in the relationship between HRM practices and proactive workplace behaviors [73]. Accordingly, the authors hypothesize:

Hypothesis 3 (H3). *Psychological empowerment has a positive impact on the innovation performance of knowledge-based employees.*

Hypothesis 4a (H4a). *Psychological empowerment has a mediating effect between workplace flexibility and the innovation performance of knowledge-based employees.*

Hypothesis 4b (H4b). *Psychological empowerment has a mediating effect between work time flexibility and the innovation performance of knowledge-based employees.*

2.2.4. The Mediating Role of Role Ambiguity

Telecommuting and FWAs may lead to role ambiguity because these work practices need to provide adequate and precise behavioral guidance [53]. Flexible work arrangements give employees more autonomy at work. Still, they also lead to less supervision and contact from supervisors and less information for employees, which leads to role ambiguity [13]. Work with autonomy may also lead to more family matters permeating the work domain [95]. For example, for teleworkers working from home, the boundaries between work and family have become so blurred that various family matters can easily affect the work domain and interfere with work. At the same time, the demand for work roles will not decrease, but due to the limited resources of employees, such as energy and time, the increase in the total demand for these two roles will be difficult to meet and eventually will result in role ambiguity.

Role ambiguity prevents individuals from perceiving work-related information, such as job goals, performance expectations, and job responsibilities. With the deepening of this research, more and more evidence supports the negative effects of role ambiguity [51,53,96]. For example, role ambiguity has been statistically significantly and negatively related to job performance [97], work motivation [98], work engagement [99], organizational commitment [100], career satisfaction [101], and so on. Several researchers have investigated the impact of role ambiguity on innovative behaviors with inconsistent results. Some studies failed to find a significant relationship between role ambiguity and innovative behaviors [13], while others found a significant negative correlation [102]. Research on innovation has shown that when distracted by other goals, people automatically engage in habitual behavior rather than innovative behavior [13]. Role ambiguity is negatively correlated with innovation performance, the finding supported by a few studies [103,104]. Whether using meta-analytical or empirical methods, most studies argue that role ambiguity negatively impacts the innovation performance of knowledge-based employees.

Sudden and unplanned telecommuting patterns change the psychosocial environment in which employees work, shifting various workforce and personal resources [105]. Therefore, it is necessary to explore its impact on employees' work innovation and performance. Under normal circumstances, properly implementing workplace flexibility requires precise planning, socialization, piloting, and evaluation [106]. Thus, according to Demerouti et al. (2014) [107], it is reasonable to assume that FWAs (e.g., workplace flexibility and work time flexibility) may negatively affect employee innovation performance by increasing role ambiguity through overload. According to the DRIVE model, FWAs bring complex role expectations to knowledge-based employees. They may also act as a job requirement that increases employee stress and tends to consume employees' limited energy and personal resources, thus increasing role ambiguity and counteracting some of the positive experiences and emotional resources that FWAs bring to employees. In order to protect their valuable resources, employees may adopt an avoidant emotional attitude and treatment in the next work tasks, which is not conducive to employees' initiative in completing innovative tasks at work or improving their innovation performance. Based on the account above, we propose the following hypotheses:

Hypothesis 5 (H5). *Role ambiguity has a negative impact on the innovation performance of knowledge-based employees.*

Hypothesis 6a (H6a). *Role ambiguity has a mediating effect between workplace flexibility and the innovation performance of knowledge-based employees.*

Hypothesis 6b (H6b). *Role ambiguity has a mediating effect between work time flexibility and the innovation performance of knowledge-based employees.*

2.2.5. The Moderating Role of Role Breadth Self-Efficacy

According to the basic assumption framework of the DRIVE model, the resource level of an individual will affect the process of physical and mental resource change in a specific situation [28]. When individuals have abundant personal resources, they can make up for lost resources and acquire new ones. Therefore, flexibility reinforces the positive effect of role breadth self-efficacy [108]. This paper argues that RBSE, as a positive self-perceived resource, will affect the resource status of individuals themselves, as well as their sensitivity to resource acquisition and resource loss. Previous research results also support the above inferences. Employees with high RBSE are more likely to make proactive behavioral responses to their perceived work environment (e.g., FWAs) and are more likely to break the constraints of established roles to perform integrative tasks [30]. Specifically, employees with high RBSEs have sufficient cognitive resources to take on the responsibilities conferred by FWAs. Role breadth self-efficacy, a positive psychological suggestion, can fully strengthen employees' positive evaluation of FWAs, improve employees' work motivation [30], and induce proactive behaviors [109] and innovative behaviors [110]. For individuals with high RBSE, employees may consider FWAs as a good opportunity to obtain resources, tending to respond positively to changes and problems, thus having more motivation and passion at work [111] and further enhancing psychological empowerment. Therefore, the following hypotheses are proposed in this study:

Hypothesis 7a (H7a). *Role breadth self-efficacy (RBSE) moderates the relationship between workplace flexibility and psychological empowerment.*

Hypothesis 7b (H7b). *Role breadth self-efficacy (RBSE) moderates the relationship between work time flexibility and psychological empowerment.*

Hypothesis 8a (H8a). *Role breadth self-efficacy (RBSE) moderates the mediating role of psychological empowerment between workplace flexibility and innovation performance.*

Hypothesis 8b (H8b). *Role breadth self-efficacy (RBSE) moderates the mediating role of psychological empowerment between work time flexibility and innovation performance.*

Employees with high RBSE have broad role competencies and are more inclined to adopt positive strategies to deal with challenges [112]. When the organization grants such employees flexibility in work, they can flexibly arrange work content according to work needs, freely choose working methods, and fully perceive that they are valued and recognized by the organization [113], thus enhancing the sense of responsibility and mission for the organization and buffering the negative impact of fuzzy roles. When organizations fail to implement FWAs, for employees whose RBSE and competence are relatively low, delegated power and responsibilities may be seen as inappropriate [114], otherwise reducing intrinsic motivation and increasing role ambiguity [115]. Therefore, such employees will feel more confused and overwhelmed when faced with complex leadership behaviors and are more likely to feel anxious about potential negative influences, thus being more likely to have role ambiguity and fall into a situation of resource depletion spiral. Although the differential effects of RBSE may be attributable to contextual factors, more research is needed to empirically investigate the moderating mechanisms of RBSE [70]. To sum up, we hypothesize that RBSE has the effect of supplementing and increasing individual psychological energy based on the DRIVE model, which can alleviate the effect of resource depletion through FWAs, reduce role ambiguity, and enhance the effect of resource gain, thereby improving psychological empowerment. Taking the above rationales and empirical findings together, we propose the following hypotheses:

Hypothesis 9a (H9a). *Role breadth self-efficacy (RBSE) moderates the relationship between workplace flexibility and role ambiguity.*

Hypothesis 9b (H9b). *Role breadth self-efficacy (RBSE) moderates the relationship between work time flexibility and role ambiguity.*

Hypothesis 10a (H10a). *Role breadth self-efficacy (RBSE) moderates the mediating role of role ambiguity between workplace flexibility and innovation performance.*

Hypothesis 10b (H10b). *Role breadth self-efficacy (RBSE) moderates the mediating role of role ambiguity between work time flexibility and innovation performance.*

Based on the DRIVE model, we propose a comprehensive framework to examine the double-edged sword effect of FWAs on employee innovation performance. Figure 1 shows the research model of this study.

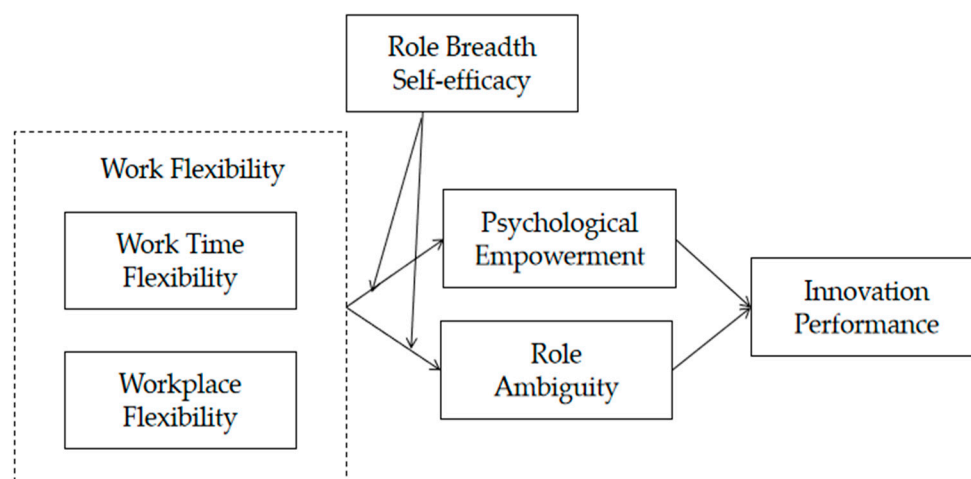


Figure 1. Conceptual framework.

3. Research Methodology

3.1. Measurement Development

After extensively reviewing previous studies, we created the survey items and translated the original measurements into Chinese. Work flexibility in this study adopts the scale developed by Chatterjee et al. (2022) [10]. There are ten items in total, such as “Workplace flexibility helps me improve my productivity”. We used the scale developed by Rizzo et al. (1970) [116] to measure role ambiguity. Cronbach’s alpha was 0.72. We reverse-coded all items, which means that the higher the score, the greater the degree of role ambiguity. Psychological empowerment was measured using a validated questionnaire proposed by Spreitzer (1995) [42], including 12 items, such as “I am confident that I can get the work tasks done” and “I have a lot of autonomy to decide when to start work”. The scale has been verified to have good reliability and validity in the Chinese context and is suitable for local application in China. We adopted the innovation performance scale from Janssen and Van Yperen (2004) [59] to investigate how often knowledge-based employees implement the following activities, including nine items such as “creating new ideas for improvements” and “generating original solutions to problems”. The internal consistency coefficient was 0.911, indicating that the design of the overall scale was reasonable. Role breadth self-efficacy was measured using a seven-item scale developed by Parker et al. (2006) [30], such as “How confident would you feel designing new procedures for your work area”. Internal consistency reliability for this scale was 0.81. Moreover, a five-point Likert scale was used for all scales, i.e., 1 for strongly disagree and 5 for strongly agree.

3.2. Data Collection

Data were collected from employees in technology-based enterprises that implement flexible work arrangements, and the surveying period lasted from August 2021 to January 2023. We selected technology-based enterprises that operated in clusters for several reasons. First, these enterprises widely apply flexible employment arrangements, especially for knowledge-based positions. Second, innovation is the core competitiveness of technology-based enterprises, and effective working mode is the key to motivating employees to innovate. Third, given the difficulty of collecting corporate data on a national scale, the Beijing–Tianjin–Hebei region was chosen due to its important role in China’s economic development and where innovation-driven development are urgent. Pilot test participants included three technology-based firms and twelve MBA students attending the Hebei University of Economics and Business (HUEB) in China. To avoid a common method bias, formal test data collection was divided into three stages. In the first stage, we collected data from the employees of technology-based enterprises on the independent variable (flexible work arrangements) in August 2021, and a total of 530 valid questionnaires were received. We coded each questionnaire. In the second stage, we sent questionnaires about mediating variables (psychological authorization and ambiguous role) to 467 employees in April 2022, and a total of 432 valid questionnaires were collected. In the third stage, in September 2022, the questionnaire for the dependent variable (innovation performance) and moderator (role width efficacy) was issued to 432 employees, and 411 valid questionnaires were collected.

From the 411 valid questionnaires, the number of male and female respondents was roughly equal, and most of them were in the 21–45 age (69.4%) group with a higher level of education. The samples were mostly from private (44.9%) and foreign-funded (32.6%) enterprises involving managers and grassroots employees (Table 1).

Table 1. Respondents’ demographics.

Demographic		Frequency	Percentage (%)
Gender	Male	208	50.6
	Female	203	49.4
Age	Under 35	94	22.9
	36–40	103	25.1
	41–50	178	43.3
	51–60	35	8.8
Education	College	55	13.4
	Bachelor’s Degree	246	59.9
	Master’s Degree	66	16.1
	PhD	28	6.8
	Other	16	3.9
Work Experience	Less than 2 years	125	30.4
	2–5 years	135	32.8
	6–10 years	104	25.3
	More than 10 years	47	11.4
Enterprise Category	State-owned enterprise	81	19.7
	Private enterprise	168	40.9
	Foreign-funded enterprise	134	32.6
	Other	28	6.8
Position	Employee	182	44.3
	Junior manager	125	30.4
	Mid-level manager	73	17.8
	Senior manager	31	7.5
	Total	411	100

4. Data Analysis and Result

According to the model structure, data characteristics, and study scenario, we used SPSS 25.0 and AMOS 22 to analyze the data.

4.1. Measurement Model

We evaluate the measurement model by factoring loading, Cronbach's α value, composite reliability (CR), and average variance extracted (AVE). The results show that Cronbach's α scores ranged from 0.853 to 0.941, and all values are greater than 0.8, indicating that all the scales have good composite reliability. The results showed that the CR value was greater than 0.7 and the AVE value was greater than 0.5, indicating that all variables had good convergent validity. Moreover, the result showed a good model fit ($\chi^2 = 834.377$, degrees of freedom [df] = 619, TLI = 0.972, CFI = 0.974, GFI = 0.89, and RMSEA = 0.027) (Tables 2 and 3).

Table 2. Factor loading, CR, and AVE.

Variables	Mean	SD	Factor Loadings	Cronbach's α	CR	AVE
WPF	3.223	0.942	0.737–0.769	0.888	0.866	0.565
WTF	3.214	0.904	0.676–0.752	0.853	0.843	0.518
PE	3.244	0.848	0.646–0.792	0.932	0.934	0.542
RA	3.213	0.951	0.758–0.805	0.908	0.905	0.613
RBSE	3.400	0.908	0.776–0.856	0.925	0.934	0.668
IP	2.824	0.913	0.766–0.839	0.941	0.944	0.652

Notes: WPF = Workplace Flexibility, WTF = Work Time Flexibility, PE = Psychological Empowerment, RA = Role Ambiguity, RBSE = Role Breadth Self-Efficacy, IP = Innovation Performance.

Table 3. Model fit.

Fit Indices	χ^2/df	GFI	AGFI	NFI	CFI	IFI	TLI (NNFI)	RMSEA
Recommended value	<3.0	>0.9	>0.8	>0.9	>0.9	>0.9	>0.9	<0.08
Actual value	1.299	0.904	0.891	0.918	0.98	0.98	0.978	0.027

Notes: df = degree of freedom, GFI = Goodness of Fit Index, AGFI = Adjusted Goodness of Fit Index, NFI = Normed Fit Index, CFI = Comparative Fit Index, IFI = Incremental Fit Index, TLI (NNFI) = Tucker-Lewis Index (Non-Normed Fit Index), RMSEA = Root Mean Square Error of Approximation.

4.2. Results of Correlation Matrix and Discriminant Validity

We measured correlation and discriminant validity. The statistical results show that there is a good correlation between all variables, except RBSE and IP, which is consistent with the predicted results. As shown in Table 4, the square root of the AVE is higher than all off-diagonal values, indicating that the research model has good discriminant validity.

Table 4. Correlation matrix and discriminant validity.

Variables	1	2	3	4	5	6
WPF	0.752					
WTF	0.515 **	0.72				
RBSE	0.288 **	0.256 **	0.817			
PE	0.417 **	0.387 **	0.134 **	0.736		
RA	0.398 **	0.440 **	0.255 *	0.191 **	0.783	
IP	0.166 **	0.182 **	−0.011	0.296 **	−0.191 **	0.807

Notes: ** $p < 0.01$, * $p < 0.05$ (two-tailed). WPF = Workplace Flexibility, WTF = Work Time Flexibility, PE = Psychological Empowerment, RA = Role Ambiguity, RBSE = Role Breadth Self-Efficacy, IP = Innovation Performance.

4.3. Common Method Bias

In the process of collecting questionnaires, in order to reduce the common methodology deviation that may occur in cross-sectional studies, we clarified the anonymity and

confidentiality of questionnaire respondents and conducted survey interviews in three periods. The single-factor test was also performed to check for common method biases. The extraction-loading sum of squares for the first principal factor is 16.178%, and the total explained variance of the scale is 65.657%, which is less than half of the total variance, indicating that most of the variation is not caused by a certain factor. Therefore, we can infer that there is no serious common method variance problem in this study.

4.4. Validation of the Hypotheses

We conducted three hierarchical regression analyses to test the hypotheses, as shown in Table 5, in Models 1 and 4, and the control variables regression on PE and RA. In Model 2, WPF, WTF, and RBSE were added to the regression equation. The results showed that both WPF ($\beta = 0.278$ and $p < 0.001$) and WTF ($\beta = 0.217$ and $p < 0.001$) significantly impacted PE, and the effect of WPF was slightly stronger. Therefore, H1a and H1b are both supported. In Model 5, WPF, WTF, and RBSE were added to the regression equation, and the results showed that WPF ($\beta = 0.208$ and $p < 0.001$) and WTF ($\beta = 0.303$ and $p < 0.001$) were all significantly affected by RA, among which WTF had a slightly stronger effect. Therefore, this result supports H2a and H2b. In Model 3, we added two interaction terms to the regression equation. The results showed that RBSE played a positive regulatory role in both pathways, but RBSE had a strong regulatory role in the relationship between WTF and PE. Therefore, H7a and H7b are supported. In Model 6, we added two interaction terms to the regression equation. The results showed that RBSE played a positive regulatory role in both pathways, but RBSE had a strong regulatory role in the relationship between WTF and RA. Therefore, H9a and H9b are accepted.

Table 5. Analysis results for interaction effect.

Variable	Psychological Empowerment			Role Ambiguity		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
WPF		0.278 ***	0.292 ***		0.208 ***	0.197 ***
WTF		0.217 ***	0.211 ***		0.303 ***	0.307 ***
RBSE		−0.05	−0.005		0.12 *	0.07
WPF × RBSE			0.106 *			−0.128 *
WTF × RBSE			0.179 ***			−0.168 **
Gender	−0.026	−0.039	−0.044	0.017	−0.007	−0.002
Age	−0.095	−0.06	−0.026	0.027	0.061	0.026
Education	0.057	0.007	0.009	0.168 **	0.098	0.096
Work experience	0.225 ***	0.151 **	0.134 *	0.052	−0.056	−0.034
Enterprise category	0.02	0.04	0.028	−0.105	−0.078	−0.066
Position	0.138 *	0.086	0.074	0.037	−0.036	−0.023
R ²	0.289	0.496	0.553	0.205	0.511	0.568
ΔR ²	0.083	0.246	0.306	0.042	0.261	0.322
F	6.122 ***	14.507 ***	15.989 ***	2.965 **	15.716 ***	17.246 ***

Notes: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$ (two-tailed). WPF = Workplace Flexibility, WTF = Work Time Flexibility, RBSE = Role Breadth Self-Efficacy.

We conducted five regressions on innovation performance, as shown in Table 6: the regression analysis of control variables of IP in Model 7. In Models 8 and 9, PE and RA were added to the regression equation. The results showed that PE ($\beta = 0.268$ and $p < 0.001$) significantly and positively affected IP, and RA ($\beta = -0.193$ and $p < 0.001$) significantly and negatively affected IP, supporting H3 and H5. In Model 11, we added all the variables for regression analysis. The results showed that WTF ($\beta = 0.194$ and $p < 0.01$) positively affected IP, but there is no direct relationship for WPF.

Table 6. Analysis results of interaction effect.

Variable	Innovation Performance				
	Model 7	Model 8	Model 9	Model 10	Model 11
WPF				0.106	0.108
WTF				0.138 *	0.194 **
RBSE				−0.072	−0.048
WPF × RBSE				0.089	0.025
WTF × RBSE				0.106	0.015
PE		0.268 ***			0.211 ***
RA			−0.193 ***		−0.327 ***
Gender	0.008	0.015	0.011	0.001	0.009
Age	−0.169 **	−0.14 *	−0.164 **	−0.129 *	−0.115 *
Education	−0.075	−0.091	−0.043	−0.086	−0.057
Work experience	0.082	0.022	0.092	0.044	0.005
Enterprise category	0.187 **	0.181 **	0.166 **	0.189 ***	0.162 **
Position	0.174 **	0.137 **	0.181 **	0.152 **	0.129 *
R ²	0.266	0.369	0.326	0.372	0.485
ΔR ²	0.071	0.136	0.106	0.138	0.235
F	5.113 ***	9.101 ***	6.852 ***	5.813 ***	9.405 ***

Notes: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$ (two-tailed). WPF = Workplace Flexibility, WTF = Work Time Flexibility, PE = Psychological Empowerment, RA = Role Ambiguity, RBSE = Role Breadth Self-Efficacy.

To further test the interactions between WPF, WTF, and RBSE, a simple slope test was conducted, and the moderating effects were plotted in Figures 2–5. According to Figure 2, when RBSE is high, WPF has a significant positive effect on PE ($\beta = 0.491$ and $p < 0.001$). When RBSE is low, WPF has no effect on PE. According to Figure 3, when RBSE is high, WTF has a significant positive effect on PE ($\beta = 0.498$ and $p < 0.001$). When RBSE is low, WTF has no effect on PE. According to Figure 3, when RBSE is high, WTF has a significant positive effect on PE ($\beta = 2.512$ and $p < 0.001$). When RBSE is low, WTF has no significant impact on PE. According to Figure 4, when RBSE is high, WPF has a negative and significant impact on RA ($\beta = -0.364$ and $p < 0.001$). When RBSE is low, WPF has a significant positive effect on RA ($\beta = 0.568$ and $p < 0.001$). According to Figure 5, when RBSE is high, WPF has a negative and significant impact on RA ($\beta = -0.352$ and $p < 0.01$), and when RBSE is low, WPF has a significant positive effect on RA ($\beta = 0.574$ and $p < 0.001$).

**Figure 2.** Interaction of role breadth self-efficacy in the relationship between workplace flexibility and psychological empowerment.

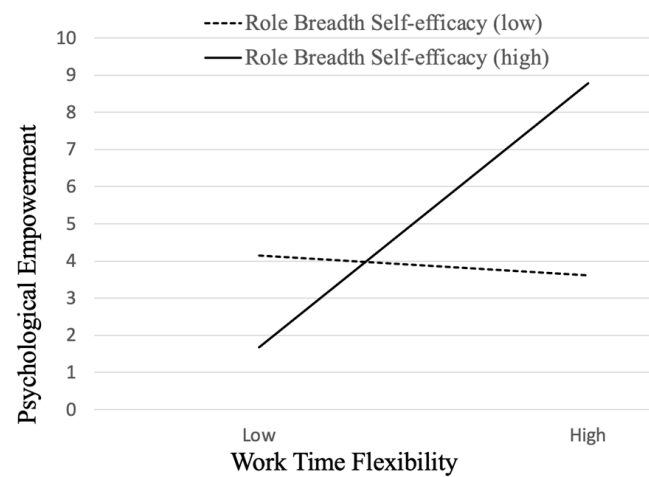


Figure 3. Interaction of role breadth self-efficacy in the relationship between work time flexibility and psychological empowerment.

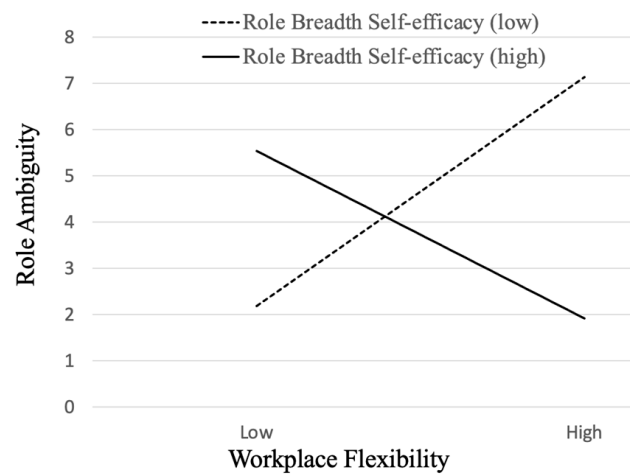


Figure 4. Interaction of role breadth self-efficacy in the relationship between workplace flexibility and role ambiguity.

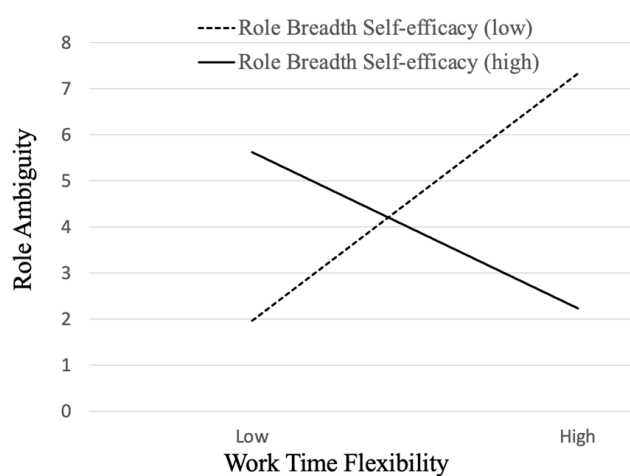


Figure 5. Interaction of role breadth self-efficacy in the relationship between work time flexibility and role ambiguity.

Continuing the in-depth analysis, according to Figure 2, when RBSE is high, WPF has a significant positive effect on PE ($\beta = 0.491$ and $p < 0.001$), and when RBSE is low, WPF does not affect PE. According to Figure 3, when RBSE is high, WTF has a significant positive effect on PE ($\beta = 0.498$ and $p < 0.001$). When RBSE is low, WTF has no effect on PE. According to Figure 3, when RBSE is high, WTF has a significant positive effect on PE ($\beta = 2.512$ and $p < 0.001$). When RBSE is low, WTF has no significant impact on PE. According to Figure 4, when RBSE is high, WPF has a negative and significant impact on RA ($\beta = -0.364$ and $p < 0.001$). When RBSE is low, WPF has a significant positive effect on RA ($\beta = 0.568$ and $p < 0.001$). According to Figure 5, when RBSE is high, WPF has a negative and significant impact on RA ($\beta = -0.352$ and $p < 0.01$), and when RBSE is low, WPF has a significant positive effect on RA ($\beta = 0.574$ and $p < 0.001$).

The bootstrap method is used to test the mediating effect in this study. The two test methods, the bias-corrected percentile method and the percentile method, are within a 95% confidence interval. If the interval composed of lower bounds and upper bounds in the indirect effect does not contain 0, the mediating effect of the change path exists. After the indirect effect is established, if the confidence interval of the direct effect also does not contain 0, it means that there is a partial mediating effect. The results are shown in Table 7.

Table 7. Bootstrap analysis results of moderation effects.

Influence Path	Effect	Bootstrapping			
		Effect Value	SE	Percentile 95% CI	
				LLCI	ULCI
WPF–PE–IP	Total effect	0.138	0.048	0.044	0.232
	Direct effect	0.048	0.050	−0.015	0.147
	Indirect effect	0.090	0.024	0.046	0.141
WTF–PE–IP	Total effect	0.168	0.050	0.071	0.266
	Indirect effect	0.086	0.052	−0.015	0.187
	Direct effect	0.082	0.028	0.037	0.145
WTF–RA–IP	Total effect	0.168	0.050	0.071	0.266
	Direct effect	0.306	0.052	0.203	0.408
	Indirect effect	−0.137	0.031	−0.202	−0.082
WPF–RA–IP	Total effect	0.138	0.048	0.044	0.232
	Direct effect	0.244	0.505	0.146	0.341
	Indirect effect	−0.106	0.29	−0.166	−0.056

Notes: WPF = Workplace Flexibility, WTF = Work Time Flexibility, PE = Psychological Empowerment, RA = Role Ambiguity, IP = Innovation Performance, SE = Standard Error, CI = Confidence Intervals, LLCI = Lower Limit Confidence Interval, ULCI = Upper Limit Confidence Interval.

The results indicate a significant mediation of PE between WPF and IP (total mediation effect of 0.138, LLCI = 0.119, ULCI = 0.253) and a significant mediation effect of PE between WTF and IP (total mediation effect of 0.168, LLCI = 0.071, ULCI = 0.266). In addition, WPF significantly mediates the relationship between RA and IP (mediation effect of 0.138, LLCI = 0.048, ULCI = 0.044), and WTF significantly mediates the relationship between RA and IP (mediation effect of 0.168, LLCI = 0.071, ULCI = 0.266). Therefore, H4a, H4b, H6a, and H6b are verified.

The PROCESS plug-in of SPSS 25.0 was used to test the moderated mediating effect by referring to the bootstrap method proposed by Hayes (2013) [117]. We chose Model 14 with a sample size of 5000. The results of the bootstrap analysis show that in the influence of workplace flexibility on innovation performance, the moderating mediating effect of role breadth self-efficacy and psychological empowerment is established, which supports H8a. Except when the score of role breadth self-efficacy is high, the indirect effect of the mediation test contains 0 (Effect = −0.041, SE = 0.026, 95% CI = [−0.096, 0.005]). Therefore, for individuals with high role breadth self-efficacy, role ambiguity does not mediate the influence of workplace flexibility on innovation performance. Thus, H10a is

not supported. In addition, when studying the influence path of work time flexibility on innovation performance, role breadth self-efficacy and psychological empowerment have a moderating mediating effect, which supports H8b (Table 8).

Table 8. Analysis results of moderated mediating effect.

Independent Variable	Mediating Variable	Moderating Variable	Effect	SE	LLCI	ULCI
WPF	PE	low	0.055	0.023	0.018	0.109
		high	0.169	0.040	0.093	0.248
	RA	low	−0.178	0.04	−0.265	−0.106
		high	−0.041	0.026	−0.096	0.005
WTF	PE	low	0.051	0.025	0.011	0.110
		high	0.154	0.043	0.079	0.247
	RA	low	−0.219	0.041	−0.302	−0.143
		high	−0.065	0.029	−0.126	−0.011

Notes: WPF = Workplace Flexibility, WTF = Work Time Flexibility, PE = Psychological Empowerment, RA = Role Ambiguity, SE = Standard Error, LLCI = Lower Limit Confidence Interval, ULCI = Upper Limit Confidence Interval.

5. Discussion and Implications for Research Practice

5.1. Discussion of Key Findings

Based on the DRIVE model, this study explores the double-edged sword effect of FWAs on employee innovation performance, as well as its influence path mechanism. The key findings are reflected in the following four aspects.

First, we found that both types of FWAs, work time flexibility (0.211 ***) and workplace flexibility (0.292 ***), had a significant positive impact on psychological empowerment, which verified H1a and H1b, with the effect of workplace flexibility being more significant. The reason for this is that workplace flexibility has more control over interactions without unplanned interference from leaders and co-workers compared to work time flexibility. Workplace flexibility gives employees broader job autonomy, effectively empowers employee discretion, increases knowledge-based employees' perceptions of psychological empowerment, and facilitates work–family balance [34]. Additionally, it is also accompanied by a reduction in costs and distractions and an increase in the quality of the work environment and sense of freedom. Both work time flexibility (0.307 ***) and workplace flexibility (0.197 ***) had a significant positive effect on role ambiguity, which validated H2a and H2b, where the effect of work time flexibility was overwhelming. Work overload occurs when the organization expects too much from employees during the available time or when job demands exceed employees' capabilities [118], which in turn causes role ambiguity [119]. As work time flexibility may imply a greater sense of availability and supervision for employees in the absence of fixed working hours, this exacerbates the negative effects of FWAs, such as blurring the boundaries of daily work, leading to long working hours and even night and weekend work [120]. Furthermore, the benefits of greater control over work cannot be realized if working time flexibility translates flexibility into a way of directing demand rather than controlling it [121].

Second, the results of this study showed that role ambiguity and psychological empowerment play negative and positive mediating roles, respectively, in the relationship between two types of FWAs (work time flexibility and workplace flexibility) and employee innovation performance. On the one hand, both types of FWAs widen the spatial distance and working time differences between employees and the organization, resulting in delayed or incomplete work information transfer, which leads to role ambiguity and requires a lot of time and energy to cope with this stress, limiting the ability to carry out sustainable innovation activities. On the other hand, the isolation of time and space brought about by FWAs enhances employees' discretion in their work, allowing them to have more resources for innovation and a wider space for innovation, thus enhancing the knowledge-based employees' own sustainable development. In addition, the positive mediating effect of

psychological empowerment is greater than the negative mediating effect of role ambiguity. With the continuous improvement of telework support technology and the development of relevant corporate policies, the positive effect of FWAs will become more prominent. These results correspond to hypotheses H4a, H4b, H6a, and H6b, which have been supported by empirical analysis and are consistent with other studies [51,122,123].

Third, role breadth self-efficacy positively moderates the relationship between two types of FWAs (work time flexibility and workplace flexibility) and psychological empowerment. It also negatively moderates the relationship between two types of FWAs (work time flexibility and workplace flexibility) and role ambiguity. As shown in Figures 2 and 3, the solid and dashed lines illustrate the effects of strong RBSE and weak RBSE, respectively. In both cases, as WPF (for H1a) and WTF (for H1b) increase, the rate of PE increase is greater under the moderating effect of strong RBSE compared to the effect of weak RBSE, as the slope of the solid line is greater than that of the dashed line in both plots. These findings are consistent with hypotheses H7a and H7b and have been supported by earlier studies [70,124]. Figures 4 and 5 depict the effects of strong RBSE (solid line) and weak RBSE (dashed line) on H2a and H2b. In both cases, as WPF (for H1a) and WTF (for H1b) increase, the rate of RA increase under the moderating effect of strong RBSE is greater than that of the weak RBSE effect because the slope of both solid lines is greater than that of both dashed lines. Hypotheses H8a and H8b were supported by and corresponded to the results of other studies. Faced with work time flexibility and workplace flexibility, knowledge-based employees with high role breadth self-efficacy are confident in performing more extra-role behaviors [66]. They have a higher ability to cope with frustration, are able to effectively stimulate beneficial perceptions of psychological empowerment, are more motivated to make improvements for the organization, and have a higher motivation to put ideas into practice. Employees with high role breadth self-efficacy are more confident than those with low role breadth self-efficacy, which helps to cushion the resource drain of FWAs, thereby reducing the negative effects of role ambiguity. Therefore, when faced with the challenges and complexities of FWAs, conflicting role demands, and role ambiguity, they believe they can fulfill the various roles and have the confidence to handle these issues.

Finally, this study aimed to investigate the double-edged sword effect of FWAs, which requires a better understanding of the opportunities, challenges, processes, and consequences of this phenomenon. The findings suggested that role breadth self-efficacy positively moderated the mediating role of psychological empowerment between the two types of FWAs and employee innovation performance, i.e., the higher the level of role breadth self-efficacy, the greater the indirect effect of both types of FWAs (workplace flexibility and work time flexibility) on employee innovation performance through psychological empowerment. What is worth paying attention to is the negative moderating effect played by role breadth self-efficacy. It was found that role breadth self-efficacy moderated the indirect effect of work time flexibility through role ambiguity on employee innovation performance, which means that the higher the level of role breadth self-efficacy, the smaller the indirect effect of work time flexibility through role ambiguity on employee innovation performance. In contrast, role breadth self-efficacy failed to significantly moderate the indirect effect of workplace flexibility on employee innovation performance through role ambiguity. Based on this finding, we can understand workplace flexibility as a “demand” because it includes job extension and reinforcement [125]. According to the DRIVE model, role breadth self-efficacy can be considered individual resources in this model. However, the hypothesis that individual resources moderate the effect of job demands on perceived stress has also not been supported by more research [27], and some divergence still exists. In general, under the moderating effect of role breadth self-efficacy, the negative effect of FWAs on employee innovation performance is weakened, while the positive effect is enhanced. The findings of this study could lead to another new development of the DRIVE model, which is more comprehensive and integrated than any previous model.

5.2. Theoretical Contributions

This study provides some meaningful theoretical contributions to the extant literature. First, according to previous studies, FWAs have been found to have both negative and positive effects, but few studies have examined the double-edged sword effect of FWAs in a single model. We apply the DRIVE model for the first time to simultaneously analyze two paths of the impact of FWAs on employee innovation performance. We used such an integrated model rather than a predetermined negative or positive perspective, and the findings confirm the double-edged sword effect exerted by FWAs. We also comparatively analyzed the differences in the mediating effects of psychological empowerment and role ambiguity and found that the positive effects outweighed the negative effects. The findings responded to the call of Boell et al. (2016) [126] for an integrated analysis of the positive and negative effects of FWAs. Thus, our findings enhance the understanding of the importance of FWAs.

Second, this study analyzed the mechanisms of the differential effects of two types of FWAs—work time flexibility and workplace flexibility, respectively—on employee innovation performance, which provided additional information on the topic. The differential performance of work time flexibility and workplace flexibility contributes to improving the knowledge system of FWAs and establishes a causal relationship between the variables. The complex model proposed in this study based on the DRIVE model advances the understanding of the impact of different types of FWAs on employee innovation performance.

Finally, our study effectively used and extended the DRIVE model, and the empirical study helped refine the model further. We identified various aspects of mediating and moderating effects, expanded the cognitive positioning factors (role ambiguity) as well as employee psychological factors (psychological empowerment) in the study, and introduced a new individual resource variable, role breadth self-efficacy, that has not been included so far. The moderating effect is the core of this model and the basis for many sustainable talent management initiatives implemented by companies. We further explored the moderating effect of role breadth self-efficacy on the “empowering” and “burdening” paths of FWAs on employee innovation performance and confirmed that role breadth self-efficacy can not only weaken the negative impact of two types of FWAs on role ambiguity but also enhance the positive impact of two types of FWAs on psychological empowerment, thus fostering strengths and circumventing weaknesses to fully utilize the advantages of FWAs. The findings enrich the research on the boundary mechanisms of the impact of FWAs on employee innovation performance.

5.3. Practical Implications

This study provides several practical implications for organizational managers to consider.

First, this study suggests that organizations need to develop flexible work policies and refine sustainable work forms and digitalization to facilitate employees’ access to some workplace flexibility or work time flexibility. When implementing FWAs, three main aspects of work should be adapted: the work task content (cognitive tasks, social interaction tasks, and physical tasks), the work methods, and the tools needed to perform the work. In this context, organizations should strengthen their digital capabilities and use digital teleworking platforms, such as Microsoft Teams, Zoom, and Tencent Meeting, among others, for virtual meetings, etc., for knowledge-based employees. Firstly, enterprises need to pay close attention to the development status of information technology; understand the characteristics, advantages, and disadvantages of different social working platforms; apply the working platform that fits the needs of enterprises; and improve the hardware conditions for digital working in enterprises. Secondly, it is important to strengthen the training of enterprise employees’ digital ability. The positive impact of digitalization on employee performance is well known. Higher organizational support in digitalization generates more employee resilience and helps knowledge-based employees tackle challenges at work firmly [127]. What is more, they need to develop long-term talent management and training strategies to pursue sustainable development of the enterprise.

The perceived characteristics of individual and organizational work can be identified using the DRIVE model to inform intervention programs. The results of this study suggest that FWAs may be both job resources and job demands. Organizational managers can meet knowledge-based employees' demand for resources, such as work autonomy, through appropriate authorization. As a means, psychological empowerment plays an important role in improving employees' positive mental state. However, managers today tend to overlook the positive influence of employees' inner psychology in the power-sharing process. Managers can motivate knowledge-based employees through the practice of empowerment by giving them the right to organize their core work time and workplace autonomously, which helps to clarify employees' personal responsibilities and work–life boundaries and alleviate role ambiguity. Although work flexibility allows knowledge-based employees to autonomously arrange the nodes and length of their working hours and leisure time and to choose their workplace, core working hours and job responsibilities need to be clarified to avoid overwork, relieve work pressure, and complete their work efficiently.

In addition, the diverse working conditions of employees in technology-based SMEs and the lack of trained human, financial, technical, and other resources pose challenges to managers' ability to provide FWAs for their employees in a sustainable manner. The management and monitoring of FWAs is a difficult aspect of implementation. Therefore, in the process of implementing FWAs, enterprises should attach importance to online communication and guidance for knowledge-based employees and provide timely and effective feedback on reports and consultations given by subordinates in order to minimize delays in their work and enhance their sense of competence in FWAs. In addition, the company should enhance the organizational culture, enhance leadership–member communication, and create a harmonious working atmosphere [128].

5.4. Limitations and Future Research Directions

Although this study makes some contributions to the existing research on FWAs and the extension of the DRIVE model, it has several limitations, which provide suggestions and opportunities for future research.

First, regarding the study sample, we used data from the Chinese region and collected 411 usable responses in three stages, which is more representative. The results of this study are yet to be further validated in other countries or regions, and future studies can collect larger sample sizes from other cultures to improve the generalizability of the model while enriching the external validity of FWAs.

Second, the samples in this study were all knowledge-based employees in small and medium-sized technology-based companies. While there are many advantages to FWAs as a work pattern, the nature of the work determines which jobs or occupations are more suitable for FWAs. Jobs that are highly suitable for FWAs include managerial and professional information technology tasks that can be performed using devices such as computers and cell phones, which can be planned in advance and performed at any time of the day and require a high degree of concentration and autonomy [129]. Future research could investigate more occupations that apply FWAs, such as a survey of managers, to enrich the diversity of FWAs.

6. Conclusions

A growing number of studies have begun to focus on flexible work arrangements. It is important to explore how flexible work arrangements can improve employee innovation performance. Based on a survey of 411 Chinese knowledge employees, this study found that (1) role ambiguity and psychological empowerment play negative and positive mediating roles in the relationship between the two types of FWAs (work time flexibility and workplace flexibility) and employee innovation performance, respectively; (2) role breadth self-efficacy positively moderated the relationship between the two types of FWAs and psychological empowerment and negatively moderated the relationship between FWAs and role ambiguity; and (3) the mediating role of psychological empowerment between

the two types of FWAs and employee innovation performance was moderated through role breadth self-efficacy. In theory, firstly, this study constructs a more comprehensive and integrated theoretical model based on the DRIVE model to study the double-edged sword effect of flexible work arrangements on employee innovation performance, which to a certain extent, complements the DRIVE model and provides useful extensions to some of the variables. Second, we validate the differential performance of the effects of work time flexibility and workplace flexibility on innovation performance. This finding helps us to better understand the types and mechanisms of flexible work arrangements, thus providing more valuable references for the field. In practice, based on the empirical results, it is recommended that organizations develop flexible work policies and improve sustainable work formats and digitalization to facilitate employees' access to some workplace flexibility or work time flexibility. Second, companies can identify the perceived characteristics of individual and organizational work based on the DRIVE model to gain more inspiration for interventions. Third, companies need to be alert to the management and regulatory challenges associated with the implementation of flexible work arrangements, strengthen leadership–member communication, and optimize organizational culture. The findings of our study provide some reference for sustainable corporate development.

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