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Sustainable Enterprise Development in the Manufacturing Sector: Flexible Employment and Innovation in China

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Abstract: Since the COVID-19 outbreak, the scope and market size of flexible employment in sustainable enterprise development have significantly increased worldwide, yet academic literature offer little information about the outcomes and moderators of flexible employment in China. The paper advances current knowledge and empirically addresses this gap by examining the effects of flexible employment on enterprise innovation input and output, with information technology capability and labor regulation as unexplored moderators. Based on data from 1179 manufacturing enterprises in China, this paper uses the OLS method to conduct empirical tests. The results show that (1) flexible employment has positively contributed to sustainable enterprise development by facilitating innovation inputs and outputs; (2) superior enterprise information technology capabilities and strict labor regulations were significant moderating factors in this relationship. The findings provide credible evidence for enterprises to pursue flexible employment as an inexhaustible impetus for sustainable economic and enterprise development.

Keywords: flexible employment; innovation; information technology capability; labor market regulation

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1. Introduction

Recently, a novel and viable alternative work option, namely flexible employment, have surfaced both in China and worldwide, particularly in the aftermath of the COVID-19 pandemic, as revealed by the International Labour Organization (ILO) in 2022. As reported by the Flexible Employment Development Report of China (2021), a vast number of flexible employees, totaling 200 million, are presently employed in sundry vocations such as network anchors, online car-hailing drivers, online platform meal delivery, courier delivery, domestic service, and designers. The surge in online shopping platforms has further heightened the need for emergency work-from-home opportunities. Notably, in the wake of the pandemic, several enterprises adopted flexible employment as a workable measure to mitigate the adverse impacts. Due to the rapid growth of e-commerce platforms, the digital economy, and technological advancement, flexible employment has become a pertinent subject of academic inquiry and policy formulation concerning national income and labor markets in China and globally. Additionally, with the ever-increasing focus on green innovation, it is vital to explore how flexible employment can be incorporated into environmentally friendly practices to reduce carbon footprint and promote sustainability.

Flexible Employment was born in industrialized developed countries as a form of employment resulting from the development of emerging industries and advances in information and communication technologies, with a concentration of highly skilled labor [1]. Flexible forms of employment, such as part-time and home-based employment, can give knowledge-intensive workers the freedom to innovate and be more productive. Academically, Atkinson introduced the notion of flexible employment, which he defined as necessary organizational flexibility to respond to market and technological changes, manage the workforce, and adopt diversified employment modes [2].

Academically, the empirical research on the multifaceted outcomes of flexible employment at various levels, including social, economic, macro, micro, corporate, and employee, presents a divergent array of results. While some scholars argue that flexible employment positively influences psychological contract, innovation tendency [3], job satisfaction, and loyalty [4], others contend that it dampens employee loyalty, high-risk tasks, and high-value innovation activities [5], and induces insecurity and conservative behavior among employees [6]. At the organizational level, academics have reported that flexible employment positively impacts enterprise revenues [7], corporate financial performance [8], labor productivity [9], enterprise absorptive capacity, and stock of knowledge [10]. Some opponents assert that flexible employment hinders enterprise innovation [11–14], particularly in the high-tech sector [15]. Some researchers have noted the adverse effect of flexible employment on inter-organizational cooperation [16,17] and dynamic environment [11]. In parallel, there is compelling evidence that the relationship between flexible employment and innovation is non-linear, represented by an inverted U-shaped curve [18–20], according to economists. Recent emphasis on innovation resides in the notion that enterprise innovation covers green and general innovation. The former is argued to facilitate profit maximization, and the latter enhances sustainability and environmental responsibility. Despite the phenomenal growth and expansion of flexible employment in China post-COVID-19, less is known about how flexible work affects input and output innovation among manufacturing enterprises in China. More so, only a few studies have focused on the internal and external factors mediating the above-noted relationship.

The relationship between labor market flexibility and innovation activities has attracted more and more attention in recent years. Still, the research on the effect of flexible employment on innovation has not been unified. Proponents argue that high layoff costs may hamper the adjustment needed for new production technologies [21]. By reducing the friction created by hiring and firing workers and lowering the cost of labor adjustment, companies are more motivated to try new, riskier, and more promising technologies [22,23]. However, opposing scholars believe technological change still requires security and stability. Labor market flexibility greatly reduces the likelihood of innovation in a conventional system with leading innovators and high barriers to entry [13].

Flexible employment has been identified as a potential driver of enterprise innovation, provided it is moderated by several factors, such as the use of trade unions, the political skills of the entrepreneur, and government supervision [24–29]. Crowley and Bourke state most reported evidence on the positive connection between flexible employment and enterprise innovation is limited to the service sector only and is rarely seen in manufacturing enterprises [25–30]. Moreover, several other external and internal moderators have been identified to affect the outcomes of flexible employment. For instance, the enterprise information technology capability (ITC) enables firms to establish efficient and swift systems for resource allocation, gain flexibility in adjusting production capacity, refine customer management and sales, and make the R&D platform more flexible and open [31,32]. Furthermore, ITC also advances cooperation efficiency within and across organizational boundaries, encourages the integration of external human resources and internal information and knowledge, promotes the acquisition and diffusion of information and expertise in knowledge innovation, and increases mutual innovation cooperation and cooperation efficiency [33,34]. Recent studies suggest that ITC has significantly influenced flexible employment during the COVID-19 pandemic [34]. ITC is crucial because it can reduce carbon footprint and enhance environmental performance. For example, cloud-based systems can reduce energy consumption and greenhouse gas emissions associated with on-premise data centers [35]. Additionally, telecommuting and videoconferencing can decrease commuting-related emissions, thereby mitigating the impact of transportation on the environment [36]. Despite the above, no published study has explored how ITC moderates the relationship between flexible employment and enterprise innovation input and output in China.

The inquiry into the effects of flexible employment necessitates scrutiny of government labor regulation policies, which have been identified as another potential determinant. Traditional labor laws and industry practices do not perceive flexible employees as conventional company affiliates, which has resulted in deficient labor rights, inadequate interest protection (e.g., training and tax services), and lack of social security benefits, e.g., industrial injury protection, medical insurance, and housing insurance [37]. Franceschi and Mariani contend that a more comprehensive investigation of the role of government labor regulations could clarify the impact of flexible employment on enterprise innovation [37]. In particular, government labor regulations that advocate for flexible employment can secure labor rights and interests for flexible employees, engendering a greater sense of security, identity, gain, and happiness at work and, as a result, higher levels of participation in innovative activities. Flexible employment characterized by distance can help improve environmental quality, less commuting time means less carbon footprint, and less traffic congestion can ease the pressure on urban governance, positively impacting carbon emissions [38]. The term "sustainable development" was first mentioned at the United Nations Conference on the Human Environment in 1972 and later gained recognition due to a report submitted to the United Nations by the World Commission on Environment and Development (WCED) in 1987, chaired by Norwegian Prime Minister Gro Harlem Brundtland (hereafter referred to as the Brundtland Report). The report presented the following definition: "Sustainable development is the development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs" (WCED, 1987:43), emphasizing the dynamic aspect of sustainability. The core idea is that all natural systems have limits, and human well-being requires living within those limits. Prior research has not fully explored the role of government labor regulations in the association between flexible employment and enterprise innovation, particularly in China. Hence, there is an untapped potential to examine how green innovation can be integrated into the government's regulatory framework for flexible employment to foster sustainable development.

Thus, this research explores the impact of flexible employment on enterprise innovation from the perspectives of innovation input and output. At the same time, this research takes enterprises' IT capability and government labor regulations as moderating factors to examine enterprises' internal and external boundary roles in this process, aiming to provide valuable references for Chinese enterprises and governments to adopt flexible employment methods. Firstly, previous studies have primarily focused on output heterogeneity [28,39,40], R&D intensity [12,20], and new product sales [25]. In contrast, this study accounts for the effects of flexible employment on both input and output aspects of enterprise innovation simultaneously, marking the first empirical investigation of its kind. Secondly, the article is a pioneering endeavor in exploring the role of two under-examined moderators: IT capability [20,31] and labor market regulations [37], in the relationship between flexible employment and enterprise innovation. Diverging from prior studies that have discounted the influence of contextual factors, the current research considers two moderating factors drawing on the principles of knowledge management theory and institutional theory. Thirdly, previous empirical evidence has primarily originated from Western and developed countries, such as Europe and the United States, limiting the generalizability of their findings, internal logic, and theoretical guidance to Asian contexts, such as China. This study contributes to the human resources management (HRM) literature by introducing the first econometric model of flexible employment (antecedent), IT capability (moderator 1), labor market regulations (moderator 2), and enterprise innovation (outcome) based on the most up-to-date data and an under-researched sector and context [30], i.e., manufacturing enterprises of an emerging Asian economy, namely China. Fourthly, the study highlights the importance of innovation in the human resource practices of manufacturing enterprises in China. Lastly, the paper not only resonates with the themes of the 2030 Agenda for Sustainable Development and the implementation of the SDGs but offers information on progress in key target areas for China. Specifically, the paper attends

to SDG 8 [41], calling for sustainable economic growth and decent job opportunities for everyone without discrimination while being environmentally friendly and socially inclusive. At the same time, the study provides support for SDG 9 [42], emphasizing developing enduring infrastructure, encouraging sustainable and inclusive industrialization, and cultivating innovation. The current model, comprising innovation (input and output), flexible employment, labor regulations, and IT capability, explains how China has successfully operationalized and channeled its workforce (particularly flexible) towards sustained and inclusive economic output by fostering innovation and technology development (IT capabilities) among firms. At the same time, the paper highlights the status-quo of labor rights protection and IT capability and their impact on the nexus between flexible employment and innovation.

The remainder of the work is structured in the following manner. Section 2 provides an academic discussion covering works on knowledge management theory, institutional theory, various forms of employment and innovation, key external factors, and research hypotheses. In Section 3, we explain our data and model, emphasizing the role of sustainable development and green enterprise development. Section 4 presents our empirical results, which support our hypotheses and offer insights into the relationship between flexible employment and innovation in the context of sustainability. Finally, in the last section, we summarize our findings, discuss practical implications, and outline limitations and future research directions.

2. Literature Review and Hypothesis Development

2.1. Flexible Employment: Background and Concept

China's economic shift from a planned to a market economy between the latter half of the 20th and early 21st centuries necessitated policies promoting flexible employment. These policies aimed to support laid-off workers and manage the employment of college graduates. Technological advances and the expansion of internet-based industries fostered a range of flexible and diversified employment opportunities. In crafting these policies, sustainable and green enterprise development considerations were prioritized, reflecting China's commitment to these crucial concerns, such as increasing employment, work diversity, and sustainable enterprise development. With the rapid growth of new internet technology and industries, new formats, and new business models, the continuous penetration of IT in various fields gave birth to flexible and diversified forms of employment.

Academically, Atkinson introduced the notion of flexible employment, which he defined as necessary organizational flexibility to respond to market and technological changes, manage the workforce, and adopt diversified employment modes [2]. Atkinson further identified two types of employees in a firm: core and peripheral. Core employees are critical resources that contribute to the competitive advantage of the firm, responsible for innovation and carrying unique knowledge and expertise of the organization. On the other hand, peripheral employees are loosely connected to the organization, and their relationship is primarily based on non-standard employment. Although peripheral employees may possess specific skills that the organization lacks, they are not expected to participate in innovation activities. They can be easily replaced to maintain the firm's quantitative flexibility of human resources. However, Matusik and Hill challenged Atkinson's core-peripheral model by arguing that quantitative flexibility can also be applied to the core areas [43]. According to them, many companies hire skilled temporary workers in the core areas to reduce structural costs and increase flexibility to cope with the rapidly changing market environment. With the development of the digital economy, the boundaries between core and peripheral employees are becoming increasingly blurred. The diversity and complexity of employment relations also make it challenging to define flexible employment clearly. This study adopts Zeytinoglu's definition of flexible employment [44], later modified by Spurk and Straub [45], which includes fixed-term contracts, paid and unpaid overtime, and on-call work. In this way, the study aims to contribute to the discussion on flexible employment and its impact on sustainable and green enterprise development.

Below, Figure 1 illustrates the mapping of academic focus on flexible employment using the VOSviewer software. The search for "flexible employment" as the keyword in the Web of Science core highlights the research hotspots in the field of flexible employment. The software automatically clusters 62 keywords with a total frequency greater than five into five categories (as shown in the figure below, the same color is a class, and the size of the circle represents the total frequency). It can be seen that the existing literature on flexible employment primarily discusses the dimensions related to performance and job insecurity, lacking consideration of enterprise innovation.

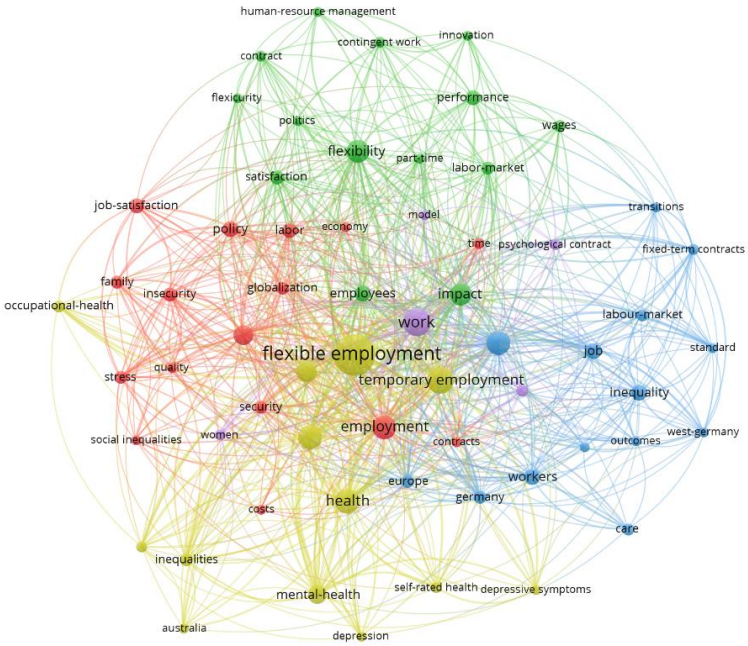

Figure 1. Key terms co-occurrence clustering knowledge map.

2.2. Flexible Employment and Innovation

As previously mentioned, the literature regarding the impact of flexible employment on innovation presents mixed results that have left scholars and researchers uncertain. Many studies have investigated this topic, producing disparate and sometimes contradictory findings. For instance, some studies have found a positive relationship between flexible employment and innovation [11,24,26,27,30,46]. However, other research has shown a negative correlation [7,8,13,37,47,48], while some have found no significant relationship [49]. Other studies have found an inverted U-shaped relationship between the two variables [18–20] and differences in their relationship across different types of innovation activities [28,39,40]. Regardless, it is essential to note that sustainable and green enterprise development has significant implications for flexible employment and innovation. Enterprises must align their flexible employment practices with sustainable development goals, such as creating decent jobs, promoting social inclusion, and reducing inequalities. Additionally, green enterprise development can stimulate innovation by promoting resource efficiency, eco-innovation, and sustainable production processes. Nonetheless, in light of these divergent findings, the following section provides an overview of selected studies in this area.

Flexible employment proponents argue it positively impacts enterprises' innovation capacity. Firstly, the influx of new talent provides a wealth of innovative ideas and opens up new social networks, thereby increasing the innovative output of enterprises. The lock-in effect that arises from long-term accumulation and habits incites conservative behavior and hesitation toward innovation activities among long-term employees [50]. Introducing new blood creates a sense of urgency among long-term employees, motivating them to participate in innovation activities and reducing internal rigidity. Higher labor mobility

allows companies to replace inefficient labor while external personnel provide fresh ideas and knowledge, inspiring enterprises to explore new sustainable processes and solutions beyond existing knowledge reserves [31,51]. Secondly, flexible employment enables enterprises to utilize more skilled and efficient employees in innovation activities. For instance, Arvanitis found innovative firms that encouraged flexible work (hiring highly qualified professionals) to complete certain creative tasks [24]. Contract employees who are explicitly authorized to engage in innovation activities and exempt from complex organizational obligations can focus solely on innovation tasks [3]. This case is particularly true for those who choose flexible employment to pursue work autonomy [49]. As such, temporary occupation of external personnel can reduce the burden of time and resources on core employees [52] during innovation activities. Thirdly, by reducing the strict restrictions on labor contract termination, flexible employment can effectively promote labor-saving innovation in companies [53,54]. Fourthly, flexible employment methods encourage enterprises to explore risky new business areas. The low dismissal cost can significantly reduce the trial cost of strategic business projects and limit employees' wage bargaining power based on innovative profits [55,56]. Finally, the flexible use of the labor force can protect long-term employees from the company's environmental turbulence, especially in dynamic environments where temporary workers can effectively promote enterprise innovation in response to layoff decisions [56,57]. In this way, the adoption of flexible employment can promote sustainable development enterprise development by encouraging innovation and creativity while providing job security for employees.

On the other hand, some critics argue that enterprises should avoid utilizing a flexible labor force. Prominent economist Schumpeter highlights the importance of enterprise stability, continuous learning, and creating and preserving enterprise-specific knowledge. From this perspective, several experts provide reasons to oppose enterprises' use of a highly flexible workforce. For one, high labor mobility may impede enterprises from acquiring specific knowledge and receiving a return on investment in training. As per the path dependence theory, improvements in employment flexibility could erode early-stage knowledge, which innovation relies upon, and the accumulation of employee training investment [58]. Employees may focus on general mastering skills, rather than enterprise-specific ones, during training and learning to enhance their competitiveness in the external labor market [59], thereby hindering enterprises' innovation activities. This inhibitory effect is more pronounced in industries with high knowledge accumulation [14].

Furthermore, flexible employment hinders the organizational commitment required for innovation [8,48]. High flexibility reduces social cohesion, trust, and social capital [60]. While flexibility may bring new knowledge and ideas to enterprises, employees lack organizational identity, view themselves as outsiders, and conceal their tacit knowledge of innovation [61]. Most managers see flexible employment as reducing costs or coping with peak employment periods rather than as a source of new ideas. Moreover, loyalty problems caused by frequent job changes may result in the disclosure of trade secrets and technical knowledge, leading to increased control and management costs for enterprises [62]. Low dismissal costs reduce workers' sense of security, making them conservative and disinclined to engage in high-risk and high-value innovation activities, less conducive to grassroots feedback [39]. Franceschi and Mariani explain that enterprises may opt to sacrifice future innovation benefits to secure a current low-cost labor force [38]. More so, Martínez-Sánchez notes that the negative impact of flexible employment on innovation is significant in high-tech enterprises [16]. Still, inter-organizational cooperation can mitigate this effect. These researchers view long-term employment as the most feasible approach to ensure a more loyal, productive, and innovative workforce in the long run, leading to sustainable development. At the same time, these scholars tend to agree that enterprises must carefully weigh the costs and benefits of employing a flexible workforce while considering their long-term sustainability and environmental impact.

In addition to the previously discussed literature, other works offer explanations for the effects of flexible employment on enterprise innovation beyond the positive and

negative outcomes, such as the non-linear and insignificant effects. Kleinkrecht et al. and Wachsen and Blind discovered that flexible employment has a minor impact on enterprise innovation in highly competitive industries with low market entry barriers and generally available knowledge [12,13]. Zhou et al. study revealed that flexible employment benefits follower enterprises more than market leaders because the former has higher requirements for learning continuity and intellectual property protection [40]. Kok and Ligthart suggested that the increase in flexible employment promotes the innovation of new products, particularly in radical innovation [25], similar to Greece's finding [28]. Altuzarra, Kato, and Zhou concluded that the relationship between flexible employment and enterprise innovation is not a simple linear one but rather an inverted "U" relationship [18,19]. Resource constraints and high internal costs make hiring informal employees an effective way for enterprises to supplement their limited human capital in innovation activities. However, excessive reliance on informal employees could be counterproductive for enterprises due to loyalty and organizational commitment issues.

Retrospectively, the literature reveals an apparent academic divergence on the various effects of flexible employment. At prime facia, a considerable body of literature reports the negative implications of flexible employment for innovation, as it disrupts various factors related to innovation, such as specific knowledge accumulation, employment relationship, innovation activities, enterprise-specific sunk costs, loyalty, information disclosure, management costs for enterprises, trustful relationships, sense of security, low firm-specific knowledge, and unwillingness to try high-risk innovation activities, among others [6,15,58,62]. In parallel, a significant amount of published research promotes the favorable impact of flexible employment on enterprise innovation by offering various arguments. Firstly, flexible workers exhibit the mental freedom necessary for breakthrough ideas [25]. Secondly, flexible workers enhance the sense of crisis and innovation motivation of conservative permanent employees (who may be stuck in the lock-in effect) [50]. Thirdly, flexible workers can enrich the organizational knowledge pool beyond the existing pool [43]. Fourthly, flexible workers possess the critical skills and specialized occupational credentials to promote the diffusion of new ideas and knowledge [27], thereby facilitating innovation activities [24]. Fifthly, flexible employment uplifts enterprise knowledge stock and innovation output by improving absorptive capacity [10]. Sixthly, flexible employment enhances human resources efficiency by expanding the knowledge pool [20,25]. Seventhly, flexible workers seeking permanent roles are highly motivated and help release the potential of core employees [52] for innovation activities, thereby improving their job satisfaction and loyalty [4]. Finally, flexible workers voluntarily choosing flexible employment exhibit relatively high favorable psychological contracts [3] and innovation tendencies [49]. This paper combs the relationship between flexible employment and enterprise innovation, as shown in Table 1. Based on the above, the paper puts forward the following hypothesis:

H1: *Flexible employment is positively related to enterprise innovation.*

Table 1. Flexible employment and innovation.

Author	Period/Sample Size	IV/DV	Method	IV-DV Effects
Michie and Sheehan [48]	• 1990 • UK • 480 firms • Manufacturing and service industries and the public and private sectors	• IV: FE • DV: R&D investment and advanced technical change	IV probit model	−
Michie and Sheehan [8]	• 1992 • UK • 240 firms • Manufacturing and service industries	• IV: FE • DV: Financial performance, PD, PC	OLS	+(Financial performance −(PD/PC)

Table 1. *Cont.*

Author	Period/Sample Size	IV/DV	Method	IV-DV Effects
Arvanitis [24]	• 1998–2000 • Switzerland • 1400 firms • All relevant industries of the business sector	• IV: FE • DV: Labor productivity, PD, PC	OLS and probit model	+
Martínez-Sánchez et al. [16]	• 2004–2005 • Spain • 156 firms • Manufacturing and service industries	• IV: FE • DV: PD, PC	OLS	−
Beugelsdijk [47]	• 1998–1999 • Holland • 988 firms • Service firms in the health sector	• IV: FE • DV: NPD (incremental and radical innovations)	Tobit and Heckman models	−
Martínez-Sánchez et al. [49]	• 2004–2005 • Spain • 156 firms • Manufacturing and service industries	• IV: FE • DV: PD, PC	OLS	Insignificant
Altuzarra [18]	• 2000–2002 • Spain • 4866 firms • Manufacturing industry	• IV: FE • DV: PD, PC, R&D	Random-effects logit model	Inverted U-shaped
Kok Robert [25]	• 2005–2006 • Holland • 407 firms • Agriculture and industry; construction; trade (whole and retail), hotel and catering, and repair industry; transport; and professional services	• IV: FE • DV: PD (incremental and radical innovations)	OLS	+
Martínez-Sánchez [11]	• 2007 • Spain • 123 firms • Automotive industry	• IV: FE • DV: PD, PC	OLS	+
Zhou [40]	• 1993–2001 • Holland • 1032 firms. • Manufacturing, services, agriculture, and non-commercial services	• IV: FE • DV: Sales of imitative and innovative new products	OLS, Tobit, Heckman and Tobit–Heckman models	+(Imitative new products) −(Innovative new products)
Vela-Jimenez [39]	• 2004–2005 • Spain • 156 firms • Manufacturing and service industries	• IV: FE • DV: Firm performance	SEMs	−

Table 1. *Cont.*

Author	Period/Sample Size	IV/DV	Method	IV-DV Effects
Wachsen and Blind [13]	• 1998–2008 • Holland • 16,453 firms • Manufacturing and service industries	• IV: FE • DV: PD, PC	Probit model	−
Franceschi and Mariani [38]	• 2001–2009 • Italy • 3000 firms • Manufacturing industry	• IV: FE • DV: Patents	OLS and 2SLS	−(More harmful in the high-tech sector)
Crowley [30]	• 2009 • Ireland • 1981 firms • Manufacturing and service industries	• IV: FE • DV: PD, service innovation	OLS	+(Service firms only)
Voudouris (2017) [28]	• Time not mentioned • Greece • 143 firms • information and communication technology, food and beverages, textile, and chemical industries	• IV: FE • DV: PD • (incremental and radical innovations)	OLS and 2SLS	+(Radical innovation only)
Di and Grassi [20]	• 2001–2004 • Italy • 2100 firms • Manufacturing industry	• IV: FE • DV: R&D intensity	Tobit model	Inverted U-shaped
Kato and Zhou [19]	• 2008–2011 • Japan • 803 firms • Manufacturing, software industries et al.	• IV: FE • DV: Patent, PD	Probit model	Inverted U-shaped
García-Sánchez [26]	• 2009 • Europe • 160 firms • high-tech manufacturing industry	• IV: FE • DV: Organizational innovation	SEM	+
Centrulo [14]	• 1998–2012 • Europe • 384 firms • Manufacturing and service industries	• IV: FE • DV: Innovation	OLS	−
Martínez-Sánchez [17]	• 2012 • Spain • 1864 industrial firms	• IV: FE • DV: PD	OLS and logit model	−
Moric [27]	• 2009 • Europe and CIS • 12,000 commercial, service, or industrial firms	• IV: FE • DV: innovation performance	OLS	+

Table 1. *Cont.*

Author	Period/Sample Size	IV/DV	Method	IV-DV Effects
Reljic [15]	• 1994–2016 • Europe • 580 observations • Manufacturing and service industries	• IV: FE • DV: PD, PC	Weighted Least Squares (WLS)	–
Kleinknecht [12]	• 1998–2008 • Holland • 1216 observations • manufacturing and commercial service sectors	• IV: FE • DV: R&D investment	Logit model	–
Kok and Ligthart [25]	• 2005–2006 • Holland • 284 observations • agriculture and manufacturing; construction; trade et al.	• IV: FE • DV: NPD, incremental innovation, radical innovation	OLS	+

Note: FE = flexible employment; process innovation; PD = product innovation; R&D = research and development; NPD = new product development (proportion of new products in total sales); SEM = structural equation model.

2.3. The Moderating Role of Information Technology

A conceivable explanation for the moderating effect of IT capability between flexible employment and enterprise innovation is rooted in previous arguments that IT indirectly promotes flexible employment, wages, salaries [34,63], and innovation [64,65]. In essence, IT capability has emerged as a fundamental pillar of enterprise innovation [64,66,67] and social employment [65], given that it serves as a key mechanism through which firms effectively leverage their tangible and intangible resources (e.g., human capital, materials, and financial resources) for multiple benefits, such as cost reduction, service delivery, human resource management, innovation, and competitiveness. Conceptually, IT capability refers to the capacity of an enterprise to mobilize and deploy IT-based resources in conjunction with other resources and capabilities [68]. The knowledge management theory, drawing on dynamic organizational capabilities, postulates that organizations can attain distinct competitive advantages if they effectively integrate their internal and external knowledge. While flexible employment creates external knowledge, acquiring and generating knowledge necessitate subsequent storage and distribution [69].

Given that IT capability can create an infrastructure for capturing and sharing knowledge across the enterprise on a previously unattainable scale [70], its moderating role in the association between flexible employment and innovation is plausible for several reasons. Firstly, IT capability empowers organizations to obtain and integrate external resources and knowledge [71,72], thereby narrowing the knowledge gaps [64] and expanding the knowledge stock and capital. Moreover, IT adoption accelerates knowledge acquisition and assimilation in areas lacking innovation. By providing the foundation for acquiring and integrating external resources and knowledge, IT capability assists enterprises in storing and internalizing external resources.

Furthermore, the capacity for information technology (IT) enables organizations to enhance communication within and between entities [67], transferring implicit and explicit knowledge and creating novel ideas. In business operations, IT improves communication efficacy [73] by expediting the dissemination of information and decentralizing organizational structures [74], thereby influencing external human resource allocation. IT capacity condenses management hierarchies, reduces expenses related to communication and information access [75], and mitigates the increased management costs associated with overseeing external workers. Simultaneously, IT capacity accomplishes the following objectives: (i) reinforces control and supervision over employees, creating a favorable

environment for implementing stringent and effective professional management; (ii) increases the efficiency and reliability of internal communication and knowledge circulation; (iii) enhances emotional communication between external workers and regular employees, fostering mutual trust and information sharing; (iv) facilitates effective information exchange, promoting innovation [73]; v) improves the organizational capacity to sense and respond to opportunities in the market and integrate business processes [76]; (vi) enables enterprises to respond to constantly changing market demands; (vii) permits employees to overcome geographical and temporal barriers, enhancing job satisfaction and employee loyalty efficiently [4]; (viii) significantly enhances organizational performance [77]. In brief, IT support empowers organizations to employ their human resources effectively and comprehensively for diverse purposes, such as cost reduction [78]. By utilizing IT to encode the skills and knowledge of external employees, firms can carry out effective skill-matching according to various innovation activities, thereby avoiding workforce redundancy and discrepancies between technical skills and innovation requirements.

Consequently, organizations can recognize and address deficiencies in enterprise resources caused by labor force changes and optimize innovation efficiency. Table 2 provides a summary of selected studies linking IT and enterprise innovation. Based on the preceding arguments, the following hypothesis is proposed:

H2: *The IT capability of enterprises positively regulates the impact of flexible employment on enterprise innovation.*

Table 2. Selected studies on the information technology–enterprise innovation nexus.

Author	Period/Sample	IV/DV	Method	Effects of IV
Kleis [64]	• 1987–1997 • US • 1000 manufacturing firms	• IV: IT, R&D • DV: Innovation output	• Log-linear model	• +(Knowledge production-mediate)
Wu [67]	• 2016 • China • 232 firms • Machinery equipment; IT industries et al.	• IV: IT capability • DV: Open innovation performance	• SEM	• +(Absorptive capacity-mediate)
Chen [66]	• Time not mentioned • China • 138 observations • Manufacturing industry	• IV: IT capabilities • DV: PD	• PLS	• +(Corporate entrepreneurship fully mediates; competitive intensity moderates)
Cai [79]	• Time not mentioned • China • 194 senior executives of firms • machinery and equipment manufacturing, electronic and information services industries, et al.	• IV: IT capability • DV: Organizational agility	• Hierarchical regression analysis	• KM capability partially mediates; innovative climate positively moderates.
Higón [80]	• 2004 • UK • 7505 SMEs • all sectors of the economy	• IV: ICT • DV: PD, PC	• Probit model	• +(on PC)

Table 2. *Cont.*

Author	Period/Sample	IV/DV	Method	Effects of IV
Jarmooka [69]	• Time not mentioned • Australia • 148 industry managers • Manufacturing et al.	• IV: ICT • DV: Innovation performance	• Regression equations and parameter estimates	• +
Zhu [65]	• 2012 • China • 2848 firms in the World Bank's survey • Manufacturing and service industries	• IV: ICT, R&D investment intensity • DV: Productivity	• OLS	• R&D and ICT investments indirectly affect productivity • through innovation (PD/PC)
Ollo-López [81]	• 2009 • Europe • 676 firms • glass, ceramics, and cement industries	• IV: The use of ICT • DV: Innovation and competitiveness.	• Probit model	• +
Hempell [82]	• 2002 and 2004 • Germany • 900 firms • Manufacturing and service industries	• IV: ICT investment • DV: PD, PC	• Probit model	• +(Employee participation and outsourcing-mediate)
Andreeva [83]	• 2010 • Finland, Russia, and China • 234 firms • Manufacturing and service industries	• IV: HRM for KM, ICT for KM • DV: Competitiveness; • financial • performance	• SEM	• +(on competitiveness) • ICT practices improve financial performance only when they are coupled with HRM practices
Ravichandran [84]	• 2004–2005 • US • 129 firms • Manufacturing, • banks, financial services industries, et al.	• IV: IT competence • DV: Organization agility	• PLS	• +(Innovation capacity moderate)
Zheng [71]	• 2016–2017 • China • 108 firms • Manufacturing industry	• IV: High-performance work system • DV: Open innovation	• Hierarchical regression analysis	• +(IT ambidexterity-moderate)

Note: PC = process innovation; PD = product innovation; R&D = research and development; HRM = human resource management; information technology; ICT = information and communications technology; SEM = structural equation model; PLS = partial least squares.

2.4. The Moderating Role of Labor Regulations

The literature demonstrates that strict labor market regulations and employment protection laws have direct and indirect effects on promoting flexible employment [85]. These effects result from the disturbance of wage inequality and the enhancement of job security [86]. In response to these regulatory shocks, firms often turn to flexible employment arrangements [87]. While experts argue that developing economies should pursue flexible labor regulations, they suggest that developed countries with a robust industrial base can sustain the relatively high cost of hiring and firing regulations [88]. According to Jahn et al. [89], flexible employment is a double-edged sword for labor markets and society, presenting incentives and challenges. Optimal productivity gains can be achieved if enterprises are certain of the need for flexible employment and the proportion of flexible workers is optimal. However, many contend that the willingness of flexible employees is

negatively related to excessive or inadequate social protection [90]. Firms are willing to pay for innovation activities in the presence of employment protection laws or labor regulations [91]. Stringent labor market regulation induces firms to maintain employment levels even if productivity declines, resulting in labor mismanagement. However, it also increases firms' willingness to pay for product or process innovations to restore productivity [92].

Numerous scholars have investigated the interplay among flexible employment, labor market regulations, and enterprise innovation. For example, Acharya et al. [47] reported the beneficial effects of dismissal laws on patents in the US, UK, France, and Germany from 1976 to 2006. Earlier research has shown that equal protection can reduce perceived inequality [92] and job insecurity among flexible and permanent employees [93]. Acharya et al. [47] further note that insecure employees are conservative and hesitant to engage in high-risk innovation activities for fear of losing their jobs. They are less motivated to participate in innovation and feel more insecure about their job security than permanent employees [93]. Rigorous employment regulations encourage employees to invest in company-specific and specialized skills, reducing excessive labor turnover. Such government regulations strengthen the organizational knowledge base and promote firm capabilities development [94], providing additional incentives to flexible employees to acquire specific knowledge [15]. Stringent labor market regulations enhance the protection of flexible employees, giving them a strong sense of security and a commitment that their short-term failures will not be punished, encouraging them to engage in innovative activities to seek promotion and other rewards [95]. Flexible employees exhibit significantly lower generalized trust levels than permanent employees [96] and a lower effective organizational commitment [97].

Furthermore, strict labor laws and regulations can safeguard enterprise profits and competitive advantage by preventing flexible employees from disclosing company secrets or sharing innovative ideas with competitors [97]. Tong et al. [98] support introducing and implementing labor regulations and employee protection laws as they can deepen employees' positive effect on a firm's innovation ability. Strict labor market regulation benefits workers' loyalty and boosts mutual trust between workers and employers [99], making managing innovation and knowledge accumulation much easier [100]. This paper combs the relationship between labor market regulation and enterprise innovation, as shown in Table 3. In light of the above, the following hypothesis is predicted:

H3: *Labor regulation positively regulates the impact of flexible employment on enterprise innovation.*

Table 3. Labor market regulation and innovation.

Author	Period/Sample	IV/DV	Method	IV-DV Effects
Acharya et al. [65]	• 1970–2006 • US, UK, France, and Germany • USPTO	• IV: LMR (Dismissal laws) • DV: Innovation (Patents)	• OLS	+ (Particularly in innovation-intensive industries)
Murphy [101]	• 1970–2007 • Developed countries • The EU KLEMS database	• IV: EPL • DV: Innovation intensity	• DID • model	–
Van [102]	• 2000–2009 • Belgium • 113112 SMEs	• IV: EPL • DV: Performance	• OLS	+
Calcagnini [103]	• 1980–2015 • Europe	• IV: Labor market regulation • DV: Innovation	• Endogenous growth models	+

Table 3. *Cont.*

Author	Period/Sample	IV/DV	Method	IV-DV Effects
Francis [104]	• 1987–2003 • 20 non-U.S. OECD countries • 90,752 firms	• IV: EPL index • DV: Innovation	• DID • model	−
Tong [98]	• 2008 • China • 4098 private firms	• IV: EPINDEX • DV: R&D; PD	• OLS	+
Feng [105]	• 2011–2015 • China • 4361 listed firms	• IV: Industrial policy • DV: Innovation efficiency	• OLS	+
García-Vega [106]	• 2010–2015 • Spain • 1766 manufacturing firms	• IV: EPL reduction • DV: PD	• DID model	+ (High R&D intensity and high demand volatility industries)
Hoxha [99]	• 2007–2015 • Germany • 16,000 manufacturing and service firms	• IV: Firing flexibility • DV: R&D	• Panel probit models	− (More harmful in low-technology industries and in start-ups)

Note: EPINDEX = employment protection index; EPL = employment protection laws; PD = product innovation; R&D = research and development; USPTO = US Patent and Trademark Office.

Based on the above hypothetical analysis, we believe that flexible employment innovation inputs and outputs and that information technology capabilities and labor control are boundary conditions in this process, so we construct Figure 2 of the model.

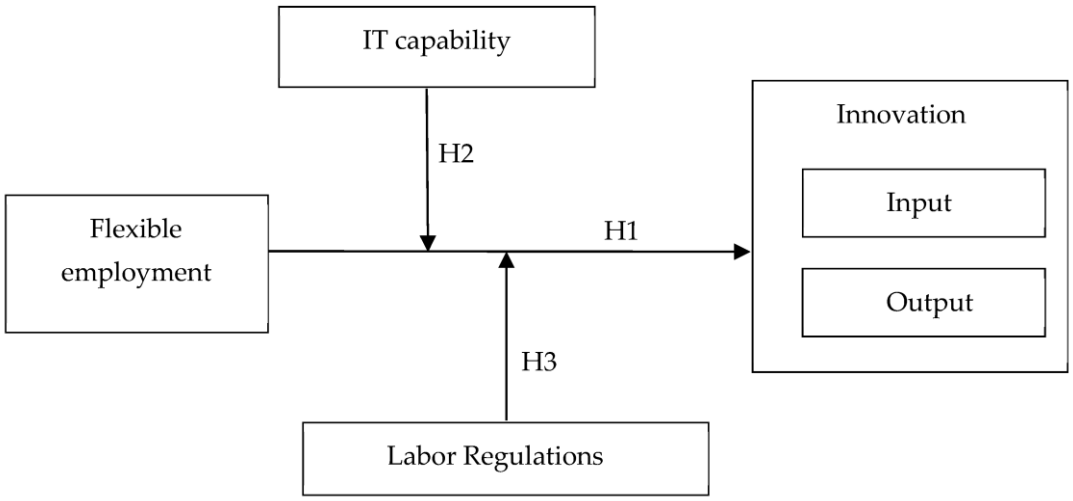

Figure 2. Research framework.

3. Research Methodology

3.1. Data Source and Sample Selection

Survey data on enterprises were collected from the World Bank report, focusing on the business environment in the Chinese market and its impact on enterprises. The survey by the World Bank was conducted from December 2011 to February 2013. It was completed by the World Bank's corporate survey team in cooperation with the China

Enterprise Survey Center, mainly through scientific sampling and face-to-face interviews with senior managers and owners, with high credibility, authority, and objectivity. This data set is currently the most up-to-date and appropriate source of data available to study China's flexible staffing problem and has been widely used in recent years [107,108]. After eliminating missing and abnormal values, 1179 valid samples of manufacturing enterprises were obtained for analysis. The World Bank survey, based on a stratified random sampling approach, covered 2848 enterprises, twenty-five cities, three regions (i.e., East, Central, and West), and more than twenty industry types, e.g., food manufacturing, textile and electronic industry, and mechanical equipment. The survey report comprises information about enterprises, business operations, business environment, science and technology, innovation, investment in information equipment development, modern information use, and adoption of communication technologies, e.g., the Internet. The World Bank survey did not cover the service sector due to data availability issues. In China, new technology platforms (e.g., Alibaba and Tencent) and the IT sector have rapidly evolved in response to the SARS epidemic (2003), followed by COVID-19. The entry of China into the 3G era in 2009 marks the mass internet penetration and mobile consumption in China. In parallel, introducing a new labor contract law in 2008 significantly strengthened labor market reforms.

3.2. Variables

3.2.1. Dependent Variable

The dependent variable, enterprise innovation, was adopted from prior research [15,109]. R&D intensity, measured by the ratio of enterprise R&D investment to enterprise sales revenues, was used as a proxy for innovation input. In contrast, the proportion of new products or services in the annual sales of enterprises was used to compute innovation output.

3.2.2. Independent Variable

Following Zeytinoglu [45], Kleinknecht [12], Wachsen and Blind [13], Di and Grassi [20], Franceschi and Mariani [37], and Daniela [58], the independent variable, flexible employment, was measured using two questions concerning the employees employed by the company at the end of 2011: (i) the number of temporary workers, (ii) the number of full-time workers. Data robustness and scale comparability between enterprises were ensured by calculating the proportion of temporary employees against the total. The World Bank defines temporary workers as workers employed for less than one year who have not promised to renew their contracts.

3.2.3. Moderators

The study used two moderators, namely IT capability and labor market regulations. Following Hu and Wang [110], firms were first asked to rate the degree to which information and communication technology (i.e., computer, network, and software) was used to support various innovation activities". Next, information was collected about the frequency of all employees using computers across multiple innovation activities. Employees rated assign the values of "those who have not used computers, often used and always used" to the integer "1~3", and finally sum them. The higher the score, the stronger the IT capability of the enterprise. The second moderator, labor market regulation, was adopted by Meyer and Vandenberg [111]. Company executives were initially asked about the impact of labor laws and regulations on company operations. For this item, the options of "no obstacle, slight obstacle, medium obstacle, large obstacle, and serious obstacle" are assigned the integer "1~5". The higher the value, the more significant the impact of labor laws and regulations on the operation of the company, which means the more substantial the labor market regulation subjectively felt by the company's executives.

3.2.4. Control Variables

Following previous approaches [40], the paper selected enterprise size, enterprise age, senior management experience, export intensity, human capital, degree of informal

competition, and financing difficulty as control variables to mitigate the impact of city and industry effects. Table 4 outlines the variable type, name, the abbreviation, and the detailed definition of all variables used in this study.

Table 4. Variables details and list.

Variable Type	Variable Name	Abbreviation	Definition
Dependent variable	Innovation investment	RD	The proportion of R&D investment in enterprise sales revenue over the past three years
	Innovation output	NPD	The proportion of new products or services in the annual sales of the enterprise
Independent variable	Flexible employment	FE	Percentage of temporary employees in the total workforce at the end of the year
Moderator	Information technology ability	IT	The frequency of innovation activities supported by information technology (1 "No", 2 "Often", and 3 "always", and use the sum
	Level of labor market regulation	LABLAW	The degree of hindering impact of labor laws and regulations on the company operations: 1 = No; 2 = Slightly; 3 = Moderate; 4 = Major; 5 = Serious.
Control variable	Enterprise size	SIZE	Employees' numbers
	Enterprise age	AGE	Number of years since the establishment of the enterprise
	Experience of senior manager	EXPE	Working years of senior managers in this industry
	Export scale intensity	EXPORT	The proportion of export revenue in the company's sales revenue
	Capacity exertion	CAPA	The proportion of enterprise output of the most significant output when all available resources are used in one year
	The proportion of main products	MAIN	The proportion of the company's primary sales products in total sales
	Human capital	HC	The proportion of technical production personnel in the total number of employees
	Degree of informal competition	FCOMP	Degree of obstacles to the company's operation caused by competitors in the informal sector: 1 = No; 2 = Slightly; 3 = Moderate; 4 = Major; 5= Serious.
	Financing difficulty	FINAN	Degree of obstacles brought by financing acquisition to the enterprise: 1 = No; 2 = Slightly; 3 = Moderate; 4 = Major; 5 = Serious.
	Location of city	MCITY	Is this city a major commercial city?: 1 = Yes; 0 = No

3.3. Data Analysis Techniques

Data analysis was conducted using Stata 14.1, while the study hypotheses were tested using an ordinary least squares (OLS) model. The least squares method makes it easy to find unknown data and chooses a regression model that minimizes the sum of squared residuals for all observations. In order to eliminate the influence of extreme values, all continuous variables were Windorized-tailed at one percent degree of significance (before and after).

4. Results and Findings

4.1. Descriptive Statistics

The mean, standard deviation, maximum and minimum values of each variable are shown in Table 5. The correlation coefficients are shown in Table 6. This paper centralized the variables before calculating the variable interaction term to reduce the impact of multicollinearity. The variance expansion factor (VIF) of each regression model was less than 2, lower than the threshold value of 10, eliminating the interference of multicollinearity.

Table 5. Descriptive statistics.

Variables	Mean Value	Standard Deviation	Minimum Value	Maximum Value
RD	0.02	0.04	0	0.2
NPD	11.8	16.94	0	65
FE	9.71	20.72	0	100
SIZE	4.53	1.15	2.4	7.31
AGE	13.6	5.92	5	31
EXPE	16.65	7.05	6	34
EXPORT	14.8	27.07	0	100
CAPA	86.68	10.07	50	100
MAIN	95.59	7.01	75	100
HC	0.36	0.22	0.06	0.82
FCOMP	0.83	0.86	0	4
FINAN	0.87	0.91	0	4
MCITY	0.88	0.33	0	1

Note: Abbreviations: RD = innovation investment; NPD = innovation output; FE = flexible employment; SIZE = enterprise size; AGE = enterprise age; EXPE = experience of senior manager; EXPORT = export scale intensity; CAPA = capacity exertion; MAIN = the proportion of main products; HC = human resource; FCOMP = degree of informal competition; FINAN = financing difficulty; MCITY = location of the city.

4.2. Hypothesis Testing

The regression results are shown in Table 7. Firstly, the regression model demonstrated the positive effect of flexible employment on enterprise innovation, supporting H1. In Model 1 (M1), the impact of flexible employment on innovation input ($\beta = 0.0003$, $p < 0.01$) and innovation output ($\beta = 0.0941$, $p < 0.01$) in Model 2 (M2) was significant and positive. After adding adjustment variables to Model 3 (M3), Model 4 (M4), Model 5 (M5), and Model 6 (M6), hypothesis H1 was still supported, confirming that the results had certain stability. Secondly, as predicted in H2, the current model validated the moderating role of IT capability in the flexible employment–enterprise innovation nexus. The results of M3 showed that the interaction term FE * IT coefficient was significantly positive ($\beta = 0.0001$, $p < 0.01$) in the flexible employment–enterprise innovation input, indicating that IT capability positively moderated the relationship between flexible employment and enterprise innovation input. Furthermore, the outputs in M4 showed that the interaction term FE * IT coefficient was also significantly positive ($\beta = 0.0117$, $p < 0.5$) in the flexible employment–enterprise innovation output. This outcome implied that the higher the IT capability to support various innovation activities, the stronger the promotion effect of flexible employment on enterprise innovation output. Thirdly, the results supported H3 by corroborating government labor regulation as a significant moderating influence in the link between flexible employment and enterprise innovation. In M5, the interaction term FE * LABLAW coefficient was significantly positive ($\beta = 0.0001$, $p < 0.1$) in the flexible employment–enterprise innovation input. Further, the interaction term FE * LABLAW coefficient in M6 was significantly positive ($\beta = 0.0570$, $p < 0.5$), indicating that the stricter the labor market management, the stronger the promotion effect of flexible employment on enterprise innovation output. Control and independent variables (i.e., enterprise scale and age) were integrated into M1 and M2. M3 and M4 were computed to analyze the moderating effect of the enterprise's internal informatization capability level (H2). M5 and M6 were tested to examine the moderating effect of enterprise external labor control level (H3).

Table 6. Pearson's Correlations.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 RD	1														
2 NPD	0.373 ***	1													
3 FE	0.144 ***	0.106 ***	1												
4 IT	0.199 ***	0.322 ***	0.004	1											
5 LABLAW	0.146 ***	0.02	0.076 ***	0.182 ***	1										
6 SIZE	0.009	0.084 ***	−0.161 ***	0.182 ***	0.058 **	1									
7 AGE	−0.005	−0.031	0.034	0.061 **	0.006	0.196 ***	1								
8 EXPE	−0.004	−0.009	−0.025	0.024	0.048 *	0.011	0.023	1							
9 EXPORT	0.055 *	0.039	0.003	0.067 **	0.054 *	0.136 ***	−0.045	0.014	1						
10 CAPA	−0.037	−0.097 ***	−0.059 **	0.147 ***	0.088 ***	0.095 ***	0.065 **	0.044	0.046	1					
11 MAIN	0.007	−0.025	0.058 **	−0.079 ***	−0.054 *	−0.111 ***	−0.013	−0.013	−0.057 **	0.017	1				
12 HC	−0.103 ***	−0.108 ***	−0.039	−0.136 ***	−0.137 ***	−0.066 **	0.014	0.024	−0.006	−0.016	0.019	1			
13 FCOMP	0.095 ***	0.096 ***	0.012	0.097 ***	0.287 ***	−0.084 ***	−0.01	−0.005	−0.003	−0.024	−0.001	−0.055 *	1		
14 FINAN	0.068 **	0.016	0.050 *	0.134 ***	0.368 ***	0.018	−0.033	0.015	−0.007	0.076 ***	−0.04	−0.078 ***	0.246 ***	1	
15 MCITY	0.005	−0.008	0.01	0.016	−0.043	0.004	0.013	0.005	−0.01	0.076 ***	−0.098 ***	−0.018	−0.006	−0.140 ***	1

Note: *, **, and *** are significant at 10%, 5%, and 1%, respectively. Abbreviations: RD = innovation investment; NPD = innovation output; FE = flexible employment; IT = information technology capability; LABLAW = level of labor market regulation; SIZE = enterprise size; AGE = enterprise age; EXPE = experience of senior manager; EXPORT = export scale intensity; CAPA = capacity exertion; MAIN = the proportion of main products; HC = human resource; FCOMP = degree of informal competition; FINAN = financing difficulty; MCITY = location of the city.

Table 7. Regression analysis results.

Variables	M1	M2	M3	M4	M5	M6
	RD	NPD	RD	NPD	RD	NPD
FE	0.0003 ***	0.0941 ***	0.0002 ***	0.0779 ***	0.0001 **	0.0560 **
	(3.274)	(3.738)	(3.154)	(3.232)	(2.002)	(1.984)
IT			0.0016 ***	1.1417 ***		
			(6.437)	(10.623)		
FE * IT			0.0001 ***	0.0117 **		
			(3.681)	(2.551)		
LABLAW					0.0059 ***	−1.0237
					(2.854)	(−1.356)
FE * LABLAW					0.0001 *	0.0570 **
					(1.663)	(1.985)
SIZE	0.0008	1.6980 ***	−0.0006	0.8401 **	0.0006	1.7186 ***
	(0.816)	(4.115)	(−0.634)	(2.074)	(0.559)	(4.161)
AGE	−0.0000	−0.1313	−0.0001	−0.1548 **	0.0000	−0.1178
	(−0.072)	(−1.627)	(−0.339)	(−2.067)	(0.073)	(−1.453)
EXPE	0.0001	−0.0035	0.0000	−0.0181	0.0000	−0.0067
	(0.510)	(−0.049)	(0.330)	(−0.264)	(0.270)	(−0.094)
EXPORT	0.0001 *	0.0076	0.0001	−0.0060	0.0001 *	0.0074
	(1.854)	(0.422)	(1.356)	(−0.351)	(1.722)	(0.407)
CAPA	−0.0001	−0.1396 **	−0.0003 **	−0.2153 ***	−0.0002	−0.1354 **
	(−1.061)	(−2.249)	(−2.057)	(−3.546)	(−1.321)	(−2.160)
MAIN	0.0001	−0.0288	0.0001	−0.0048	0.0001	−0.0300
	(0.761)	(−0.369)	(0.777)	(−0.067)	(0.862)	(−0.382)
HC	−0.0157 ***	−7.0097 ***	−0.0107 **	−3.6291 *	−0.0136 **	−7.3824 ***
	(−2.848)	(−3.041)	(−1.999)	(−1.650)	(−2.494)	(−3.191)
FCOMP	0.0047 ***	2.0300 ***	0.0042 ***	1.5486 ***	0.0034 **	2.1608 ***
	(3.066)	(3.425)	(2.935)	(2.756)	(2.097)	(3.596)
FINAN	0.0019	−0.4545	0.0010	−1.0534 **	0.0007	−0.1458
	(1.326)	(−0.848)	(0.722)	(−2.073)	(0.446)	(−0.249)
MCITY	0.0008	0.0945	−0.0006	−0.2866	0.0010	0.1443
	(0.288)	(0.054)	(−0.230)	(−0.186)	(0.366)	(0.084)
Constant	0.0079	20.4646 **	0.0020	12.3175	0.0105	20.6616 **
	(0.418)	(2.092)	(0.109)	(1.375)	(0.561)	(2.113)
Observations	1179	1179	1179	1179	1179	1179
R-squared	0.066	0.064	0.128	0.166	0.080	0.069
sector	yes	yes	yes	yes	yes	yes

Note: *, **, and *** are significant at 10%, 5%, and 1%, respectively. Abbreviations: RD = innovation investment; NPD = innovation output; FE = flexible employment; IT = information technology capability; LABLAW = level of labor market regulation; SIZE = enterprise size; AGE = enterprise age; EXPE = experience of senior manager; EXPORT = export scale intensity; CAPA = capacity exertion; MAIN = the proportion of main products; HC = human resource; FCOMP = degree of informal competition; FINAN = financing difficulty; MCITY = location of the city.

Overall, the regression results supported that flexible employment enhances enterprises' innovation input and output. The data affirmed that IT enterprise capability and labor regulations support sustainable development in flexible employment and innovation.

4.3. Robustness Checking

The current study adopted three methods (tri-method regression analysis) for checking the robustness of the present results, as seen below in Method 1 (Table 8), Method 2 (Table 9), and Method 3 (Table 10). The robustness checks were conducted in the following steps. Initially, the average flexible employment level at the city level was calculated (Method 1—Table 8). Regression was estimated after deleting Guangzhou and Dongguan city enterprise samples, i.e., maximum and minimum flexible employment levels were excluded. Next, the regression was estimated after deleting Shanghai with a sample number of enterprises less than 15 (Method 2—Table 9). In order to replace the explained variables, the paper substituted the two continuous variables of "the ratio of enterprise R & D investment to enterprise sales revenue" and "the proportion of new products or

services to annual enterprise sales" in the original regression model with the corresponding dummy variable item in the questionnaire, i.e., "has the company invested funds in R & D activities in the past three years?" and "has this organization launched any new products or services in the past three years?" "Yes" is assigned "1", and "no" is given "0". Table 10 (Method 3) shows the Probit regression results after changing the explained variables' measurement items. Overall, the results of the tri-method robustness check were consistent with the regression results in Table 7, confirming that the impact of flexible employment on enterprise innovation was significantly positive at the level of 5%, even in the presence of the two moderators, i.e., the degree of information technology and the labor regulation.

Table 8. Robustness check: Method 1.

Variables	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**
	RD	**NPD**	**RD**	**NPD**	**RD**	**NPD**
FE	0.0003 ***	0.0941 ***	0.0002 ***	0.0779 ***	0.0001 **	0.0560 **
	(3.274)	(3.738)	(3.154)	(3.232)	(2.002)	(1.984)
IT			0.0016 ***	1.1417 ***		
			(6.437)	(10.623)		
FE * IT			0.0001 ***	0.0117 **		
			(3.681)	(2.551)		
LABLAW					0.0059 ***	−1.0237
					(2.854)	(−1.356)
FE * LABLAW					0.0001 *	0.0570 **
					(1.663)	(1.985)
SIZE	0.0008	1.6980 ***	−0.0006	0.8401 **	0.0006	1.7186 ***
	(0.816)	(4.115)	(−0.634)	(2.074)	(0.559)	(4.161)
AGE	−0.0000	−0.1313	−0.0001	−0.1548 **	0.0000	−0.1178
	(−0.072)	(−1.627)	(−0.339)	(−2.067)	(0.073)	(−1.453)
EXPE	0.0001	−0.0035	0.0000	−0.0181	0.0000	−0.0067
	(0.510)	(−0.049)	(0.330)	(−0.264)	(0.270)	(−0.094)
EXPORT	0.0001 *	0.0076	0.0001	−0.0060	0.0001 *	0.0074
	(1.854)	(0.422)	(1.356)	(−0.351)	(1.722)	(0.407)
CAPA	−0.0001	−0.1396 **	−0.0003 **	−0.2153 ***	−0.0002	−0.1354 **
	(−1.061)	(−2.249)	(−2.057)	(−3.546)	(−1.321)	(−2.160)
MAIN	0.0001	−0.0288	0.0001	−0.0048	0.0001	−0.0300
	(0.761)	(−0.369)	(0.777)	(−0.067)	(0.862)	(−0.382)
HC	−0.0157 ***	−7.0097 ***	−0.0107 **	−3.6291 *	−0.0136 **	−7.3824 ***
	(−2.848)	(−3.041)	(−1.999)	(−1.650)	(−2.494)	(−3.191)
FCOMP	0.0047 ***	2.0300 ***	0.0042 ***	1.5486 ***	0.0034 **	2.1608 ***
	(3.066)	(3.425)	(2.935)	(2.756)	(2.097)	(3.596)
FINAN	0.0019	−0.4545	0.0010	−1.0534 **	0.0007	−0.1458
	(1.326)	(−0.848)	(0.722)	(−2.073)	(0.446)	(−0.249)
MCITY	0.0008	0.0945	−0.0006	−0.2866	0.0010	0.1443
	(0.288)	(0.054)	(−0.230)	(−0.186)	(0.366)	(0.084)
Constant	0.0079	20.4646 **	0.0020	12.3175	0.0105	20.6616 **
	(0.418)	(2.092)	(0.109)	(1.375)	(0.561)	(2.113)
Observations	1179	1179	1179	1179	1179	1179
R-squared	0.066	0.064	0.128	0.166	0.080	0.069
sector	yes	yes	yes	yes	yes	yes

Note: delete the enterprise samples of Guangzhou and Dongguan with the maximum and minimum flexible employment level, and then carry out the regression estimation. *, **, and *** are significant at the level of 10%, 5% and 1% respectively. Abbreviations: RD = innovation investment; NPD = innovation output; FE = flexible employment; IT = information technology capability; LABLAW = level of labor market regulation; SIZE = enterprise size; AGE = enterprise age; EXPE = experience of senior manager; EXPORT = export scale intensity; CAPA = capacity exertion; MAIN = the proportion of main products; HC = human resource; FCOMP = degree of informal competition; FINAN = financing difficulty; MCITY = location of the city.

Table 9. Robustness check: Method 2.

Variables	M1	M2	M3	M4	M5	M6
	RD	NPD	RD	NPD	RD	NPD
FE	0.0003 ***	0.0952 ***	0.0002 ***	0.0792 ***	0.0002 **	0.0562 **
	(3.313)	(3.780)	(3.204)	(3.285)	(2.078)	(1.988)
IT			0.0016 ***	1.1487 ***		
			(6.551)	(10.632)		
FE * IT			0.0001 ***	0.0116 **		
			(3.669)	(2.521)		
LABLAW					0.0061 ***	−1.1685
					(2.931)	(−1.547)
FE * LABLAW					0.0001	0.0589 **
					(1.619)	(2.043)
SIZE	0.0009	1.7040 ***	−0.0005	0.8501 **	0.0007	1.7283 ***
	(0.916)	(4.109)	(−0.546)	(2.088)	(0.656)	(4.163)
AGE	−0.0000	−0.1215	−0.0001	−0.1478 **	−0.0000	−0.1068
	(−0.164)	(−1.501)	(−0.458)	(−1.966)	(−0.041)	(−1.313)
EXPE	0.0001	−0.0082	0.0000	−0.0199	0.0000	−0.0113
	(0.448)	(−0.116)	(0.290)	(−0.289)	(0.213)	(−0.159)
EXPORT	0.0001 *	0.0088	0.0001	−0.0056	0.0001	0.0089
	(1.764)	(0.492)	(1.236)	(−0.325)	(1.618)	(0.489)
CAPA	−0.0001	−0.1433 **	−0.0003 **	−0.2211 ***	−0.0002	−0.1386 **
	(−1.008)	(−2.306)	(−2.024)	(−3.638)	(−1.274)	(−2.208)
MAIN	0.0001	−0.0243	0.0001	0.0026	0.0001	−0.0255
	(0.600)	(−0.311)	(0.640)	(0.037)	(0.698)	(−0.324)
HC	−0.0150 ***	−6.7010 ***	−0.0100 *	−3.3421	−0.0129 **	−7.1136 ***
	(−2.711)	(−2.890)	(−1.862)	(−1.510)	(−2.362)	(−3.056)
FCOMP	0.0047 ***	2.1684 ***	0.0042 ***	1.6257 ***	0.0033 **	2.3350 ***
	(3.027)	(3.616)	(2.849)	(2.842)	(2.008)	(3.837)
FINAN	0.0018	−0.4495	0.0009	−1.0464 **	0.0006	−0.1044
	(1.282)	(−0.837)	(0.678)	(−2.056)	(0.382)	(−0.178)
MCITY	0.0007	0.1295	−0.0008	−0.2684	0.0009	0.1846
	(0.237)	(0.074)	(−0.288)	(−0.175)	(0.311)	(0.107)
Constant	0.0095	19.9646 **	0.0033	11.6643	0.0123	20.1081 **
	(0.496)	(2.032)	(0.176)	(1.304)	(0.644)	(2.049)
Observations	1172	1172	1172	1172	1172	1172
R-squared	0.065	0.066	0.129	0.169	0.080	0.071
Sector	yes	yes	yes	yes	yes	yes

Note: The regression estimation is carried out after deleting Shanghai with a sample number of enterprises less than 15. *, **, and *** are significant at the level of 10%, 5% and 1% respectively. Abbreviations: RD = innovation investment; NPD = innovation output; FE = flexible employment; IT = information technology capability; LABLAW = level of labor market regulation; SIZE = enterprise size; AGE = enterprise age; EXPE = experience of senior manager; EXPORT = export scale intensity; CAPA = capacity exertion; MAIN = the proportion of main products; HC = human resource; FCOMP = degree of informal competition; FINAN = financing difficulty; MCITY = location of the city.

Table 10. Robustness check: Method 3.

Variables	M1	M2	M3	M4	M5	M6
	R&D	PD	R&D	PD	R&D	PD
FE	0.0033 ***	0.0023 ***	0.0030 ***	0.0019 ***	0.0028 ***	0.0016 *
	(5.084)	(3.542)	(4.909)	(3.257)	(3.531)	(1.939)
IT			0.0237 ***	0.0327 ***		
			(8.363)	(11.615)		
FE * IT			0.0003 **	0.0003 ***		
			(2.288)	(2.921)		
LABLAW					0.0199	−0.0357
					(0.901)	(−1.587)
FE * LABLAW					0.0006	0.0011
					(0.739)	(1.267)
SIZE	0.0972 ***	0.0635 ***	0.0803 ***	0.0406 ***	0.0964 ***	0.0643 ***
	(8.395)	(5.139)	(7.019)	(3.387)	(8.307)	(5.181)
AGE	−0.0018	−0.0027	−0.0023	−0.0034	−0.0017	−0.0025
	(−0.832)	(−1.153)	(−1.098)	(−1.562)	(−0.781)	(−1.045)
EXPE	0.0034 *	0.0001	0.0030	−0.0005	0.0033 *	0.0001
	(1.814)	(0.051)	(1.595)	(−0.287)	(1.713)	(0.053)
EXPORT	0.0008	0.0011 **	0.0006	0.0008	0.0008	0.0011 **
	(1.592)	(2.041)	(1.178)	(1.519)	(1.553)	(2.063)
CAPA	0.0006	0.0011	−0.0010	−0.0011	0.0005	0.0012
	(0.392)	(0.732)	(−0.686)	(−0.752)	(0.316)	(0.827)
MAIN	−0.0043 **	−0.0053 ***	−0.0036 *	−0.0044 **	−0.0042 **	−0.0055 ***
	(−2.147)	(−2.636)	(−1.832)	(−2.300)	(−2.106)	(−2.687)
HR	−0.2056 ***	−0.0727	−0.1454 **	0.0106	−0.1996 ***	−0.0838
	(−3.320)	(−1.131)	(−2.437)	(0.172)	(−3.207)	(−1.293)
FCOMP	0.0559 ***	0.0992 ***	0.0443 ***	0.0828 ***	0.0516 ***	0.1042 ***
	(3.293)	(5.592)	(2.790)	(4.909)	(2.947)	(5.696)
FINAN	0.0632 ***	0.0365 **	0.0509 ***	0.0196	0.0595 ***	0.0462 ***
	(4.001)	(2.172)	(3.396)	(1.266)	(3.534)	(2.629)
MCITY	−0.1078 ***	0.1075 **	−0.1150 ***	0.0986 **	−0.1063 ***	0.1081 **
	(−2.692)	(2.392)	(−2.920)	(2.501)	(−2.661)	(2.417)
Constant	0.4676 *	0.5135 **	0.2870	0.2548	0.4747 *	0.5230 **
	(1.882)	(2.047)	(1.152)	(1.057)	(1.907)	(2.077)
Observations	1236	1236	1236	1236	1236	1236
R-squared	0.154	0.104	0.206	0.198	0.156	0.107
Sector	yes	yes	yes	yes	yes	yes

Note: To replace the explained variables, this paper replaces the two continuous variables of "the ratio of enterprise R & D investment to enterprise sales revenue" and "the proportion of new products or services to annual enterprise sales" in the original regression model with the corresponding dummy variable item in the questionnaire. *, **, and *** are significant at the level of 10%, 5% and 1% respectively. Abbreviations: R&D = innovation investment; PD = innovation output; FE = flexible employment; IT = information technology capability; LABLAW = level of labor market regulation; SIZE = enterprise size; AGE = enterprise age; EXPE = experience of senior manager; EXPORT = export scale intensity; CAPA = capacity exertion; MAIN = the proportion of main products; HC = human resource; FCOMP = degree of informal competition; FINAN = financing difficulty; MCITY = location of the city.

4.4. Endogenous Test

Firms may use flexible employment to avoid potential failure linked to risky long-term innovation projects, thereby opening possibilities and the problem of two-way causality. Following Besley and Burgess [112], the paper addressed this issue by adopting city employment flexibility of enterprise as the instrumental variable of the model for regression estimation. The endogenous testing regression results are shown in Table 11. The F-value in each regression equation (i.e., greater than 10%) supported that the problem of weak instrumental variables did not exist, implying that instrumental variables were effective and reasonable. After overcoming the endogenous problem, the coefficient of flexible employment in the regression results of R&D activities and innovation activities remained significantly positive at a one percent level, showing the robustness of the results.

Table 11. Endogeneity test.

Variables	M1	M2	M3	M4
	RD	**NPD**	**RD**	**NPD**
FE	0.0011 ***	0.5177 ***	0.0011 ***	0.5148 ***
	(6.459)	(6.784)	(6.279)	(6.677)
SIZE			0.0037 ***	3.0573 ***
			(2.866)	(5.524)
AGE			−0.0003	−0.2664 ***
			(−1.358)	(−2.751)
EXPE			0.0000	−0.0062
			(0.169)	(−0.080)
EXPORT			0.0000	−0.0086
			(0.782)	(−0.419)
CAPA			−0.0000	−0.1007 *
			(−0.356)	(−1.818)
MAIN			−0.0001	−0.1148
			(−0.487)	(−1.433)
HR			−0.0119 **	−5.3179 **
			(−2.014)	(−2.108)
FCOMP			0.0043 ***	1.9788 ***
			(2.784)	(2.998)
FINAN			0.0005	−1.0878 *
			(0.339)	(−1.693)
MCITY			0.0012	−0.4036
			(0.296)	(−0.238)
Constant	0.0077 ***	6.7682 ***	0.0060	18.0973 *
	(3.572)	(7.291)	(0.270)	(1.902)
Observations	1179	1179	1179	1179
Sector	yes	yes	yes	yes

Note: use the employment flexibility of the city where the enterprise is located as the instrumental variable of the model for regression estimation. *, **, and *** are significant at the level of 10%, 5% and 1% respectively. Abbreviations: R&D = innovation investment; NPD = innovation output; FE = flexible employment; IT = information technology capability; LABLAW = level of labor market regulation; SIZE = enterprise size; AGE = enterprise age; EXPE = experience of senior manager; EXPORT = export scale intensity; CAPA = capacity exertion; MAIN = the proportion of main products; HC = human resource; FCOMP = degree of informal competition; FINAN = financing difficulty; MCITY = location of the city.

5. Conclusions and Discussion

5.1. Discussion

The current empirical model estimated the interaction between flexible employment and enterprise innovation (output and input) in China while measuring the moderating effects of IT capability and labor market regulation. This study advances current literature by measuring the impact of flexible employment on enterprise innovation input and output conjointly. This result support prior studies that have independently confirmed the positive impact of flexible employment on enterprise innovation input [26] and output [24–28]. In contrast, the study could not validate Kato and Zhou [19] and Di and Grassi's [20] assertion that the flexible and enterprise innovation nexus is inverted U-shaped or negative [13,17,94]. A feasible explanation for the inverted U-shaped or negative relationships resides in the research context of previous studies, i.e., developed countries with robust innovation capabilities and high-skilled human resources, e.g., Italy [20,38], Spain [17], or other European countries [15]. Unlike the growth of flexible employment in developed countries, flexible work in China emerged with the development of the Internet economy. Many companies born with the Internet have benefited from innovation through digital and community-based methods such as sharing, openness, crowdsourcing, participation, and value co-creation, which led to more positive effects in flexible employment. The current analysis concluded that flexible employment had facilitated Chinese enterprises in enhancing innovation inputs and outputs for sustainable enterprise development. More importantly, this finding validates the SDG 8.2, 8.3, 8.4, and 8.5 targets, asserting that the

countries should promote full employment and innovation to support production activities, create flexible employment, entrepreneurship, creativity, and innovation, and encourage the regularization and development of micro-, small-, and medium-sized enterprises [41]. In sum, the above finding affirms SDG 8 by encouraging the creation of full and productive employment and decent work for all women and men, including young people and persons with disabilities [41].

Second, the results suggested that superior IT capabilities add to the positive influence of flexible employment on enterprise innovation, a view consistent with prior works [4,67,73]. The empirical model demonstrated that IT capability complements the favorable influence of flexible employment on innovation by mechanisms such as integrating knowledge and promoting communication. Thus, it can be concluded that enterprises developing IT capabilities and infrastructure to facilitate knowledge transfer and information exchange enhances their innovation potential through flexible staffing. Our research enriches knowledge management theory by showing the potential upside of IT capability on enterprise innovations. As noted earlier, many scholars have paid attention to the direct impact of IT capability on innovation [55,69], ignoring the positive effect of the combination of IT capabilities and flexible employment on enterprise innovation [83]. IT capabilities help enterprises effectively manage and utilize the knowledge introduced by flexible employment. Furthermore, flexible employment enables enterprises the dynamic capabilities to respond to the changing external markets detected by IT capabilities. In this study, the significant role of IT capability as a moderator variable identifies the boundary conditions of the relationship between flexible employment and innovation, which enriches the related research on IT capability and reconfirms the role value of the digital Internet economy. Significantly, the above finding authenticates the targets set out in SDG 9.4, 9.5, and 9.8 that call for increasing access to information and communications technology, enhancing scientific research, and upgrading the technological capabilities of industrial sectors in all countries, particularly in developing countries [42]. China's employment environment has been integrated with information technology, and the development of information technology greatly enhances the possibility of flexible employment in China.

Third, the results affirmed that strict labor regulation enables the positive impact of flexible employment on enterprise innovation, a view echoing previous findings [85,91,98]. In line with Balz [93] and Hoxha [99], the data validated that stringent labor market regulations improve job security and mutual trust between flexible workers and enterprises. Consequently, flexible employees are willing to be trained for firm-specific and specialized skills, making knowledge accumulation much easier. Furthermore, they will be motivated to seek innovative activities for promotion and other rewards. This result offers credible evidence for implementing labor market regulations in China. Only by creating a normative legal atmosphere can firms that abide by the rules and laws not suffer losses and enable entrepreneurs to operate with peace of mind, invest confidently, and concentrate on innovation. In this aspect, our study represents an initial effort to examine how flexible employment interacts with IT capabilities and labor market regulation to affect enterprise innovation. Besides filling a significant gap in the extant literature, this above result offers credence to the SDG 9.6 and 9.7 targets, i.e., strengthening financial and technical support, supporting domestic technology development, and improving research and innovation in developing countries, by ensuring a conducive policy environment [42]. Further, the current result is consistent with the SDG 8.6 and 8.8 targets, proposing to reduce the proportion of youth not in employment, education, or training, protecting labor rights for those in precarious employment [41]. With flexible employment emerging and gaining momentum in China and worldwide after the COVID-19 pandemic, it can be concluded that regulating flexible work to protect labor rights can yield favorable outcomes.

5.2. Conclusions

The paper explored the effects of flexible employment on enterprise innovation input and outputs in China while simultaneously focusing on the moderating role of IT capability

and government regulations. Data from 1179 manufacturing enterprises were analyzed to assess the unattended moderating influence of IT capability and labor market regulation. The empirical analysis indicated that flexible employment positively impacted the input and output of enterprise innovation, in support of our initial hypothesis. Additionally, the model validated that IT capability and labor market regulation are significant moderators in the relationship between flexible employment and enterprise innovation. A tri-method robustness check verified the results from our regression models. The endogeneity test indicated no evidence of two-way causality, confirming the validity of the instrumental variable employed in the current study.

To summarize, unlike the developed countries, the data supported that flexible employment promotes innovation, development, and inclusivity in Chinese enterprises. At the same time, strengthening IT capabilities and standardized labor market regulation can deepen this process. This paper finds that adopting flexible employment practices can enhance innovation and productivity in enterprises, leading to greater economic growth and social well-being. Moreover, creating a conducive flexible working environment, protecting labor rights, and enhancing information and communication technologies will benefit sustainable development.

The managerial and policy implications of this paper are as follows. The current findings call for enterprises to view flexible employment as a source of new knowledge for innovation rather than solely as a cost-saving measure. For a long time, Chinese manufacturing enterprises have been situated at the bottom of the "smile curve", relying heavily on low-cost labor forces. It is time for enterprises to break away from this dependence and utilize flexible employees to introduce new knowledge, improve overall innovation levels, and establish a unique competitive advantage. However, enterprises must also increase their investment in training for flexible employees, improve employment structures, and standardize flexible employment management to ensure successful integration. The present finding stresses the importance of strengthening IT capabilities, which are more sustainable than flexible employment. Enterprises should take measures to promote the digital transformation of human resources, support knowledge acquisition and exchange among employees, and utilize external intelligence and wisdom to drive innovation and growth in the era of the digital economy. In line with SDGs 8 and 9 asserting enterprises to upgrade infrastructure for sustainability, with increased resource-use efficiency [42], this study suggests that enterprises should diversify and upgrade their employment pool and structure through technology and other means to cater to the needs of flexible employees. If properly undertaken, such measures can help enterprises to manage changes in employment structure and standardize employment management, mitigate resist risks and costs, and harness innovation. In short, enterprises should harness all parties' collective wisdom and efforts to promote the transformation of China's manufacturing industry from "Made in China" to "Created in China".

Another critical implication of this study extends to the realm of governance. Firstly, the government should develop a new generation of information networks and effectively construct infrastructures such as 5G, data centers, artificial intelligence, the industrial Internet, and the "Internet of Things". Secondly, as listed in SDG 9, the government should support enterprises to apply information technology and provide the necessary support for enterprise informatization. Such policies should focus on removing obstacles, information infrastructure construction, improving the quality of information services, and reducing the cost of information services. The government needs to create a shared platform enabling enterprises to efficiently and effortlessly adopt flexible employment practices, thereby facilitating the digital transformation and upgrading of the manufacturing industry. Following the tenets of SDG 9 [42], this study suggests the government may increase access to technological capabilities, especially information and communications technology, to support domestic technology development, research, and innovation in China. Thirdly, a robust social security system must be established for flexible employment groups to safeguard their legitimate rights and interests. Through effective labor regulations, the

government can alleviate occupational pain points such as work-related injuries and the "youth rice anxiety" that afflict flexible employees. In so doing, employees will not only feel secure in their roles but will also be able to contribute more entirely to their companies' innovation initiatives. Effective government policies have the potential to unlock the benefits of flexible employment while simultaneously mitigating its downsides, thus promoting the healthy and orderly development of flexible employment. In line with SDG 8 [41], this paper advances the idea that protecting labor rights and promoting safe and secure working environments for all flexible employees in China could benefit enterprises and the economy.

This paper also has the following limitations. Firstly, since the data of Chinese enterprises surveyed by the World Bank is the latest high-quality cross-sectional data available, the impact of flexible employment on enterprise innovation lags to some extent. The latest longitudinal data can be considered for verification in future research. Secondly, due to data limitations, this paper only studied flexible employment, but future literature can consider subdividing flexible employment into different types for specific discussion. Thirdly, the research result that flexible employment is conducive to enterprise innovation does not mean that the flexibility of the labor force can be infinitely increased. Future research can explore the non-linear relationship between flexible employment and enterprise innovation. Analyzing the optimal value of flexible employment affecting enterprise innovation may bring fresh insight. This paper studies the impact of flexible employment on enterprise innovation in China. Future literature can integrate different institutional backgrounds to compare the various effects of flexible employment with other countries, especially developed countries.

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