

## The Effect of Millennial Employees' Social Media Competence and Future Work Self-Salience on Bootleg Innovation

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**Abstract.** Currently, millennial employees are gradually becoming the backbone of innovation in various organizations. In the digital economy, with the widespread use of virtual workplaces, organizational flattening and virtualization, millennial employees' social media competency, informal role, and future work self-salience have become important work behavior influencing factors. On the other hand, millennial employees' informal role and future work self-salience are reshaped by differences in social media competency, which may have an impact on bootleg innovation. This study investigate the mechanism of the relationship between millennial employees' informal role, future work self-salience, etc. and bootleg innovation in a virtual workplace based on regulatory focus theory and resource conservation theory. The study shows that: social media competency significantly affects millennial employees' bootleg innovation behavior; future work self-salience significantly affects millennial employees' bootleg innovation behavior; future work self-salience has a significant mediating effect on the relationship between social media competency and bootleg innovation; informal role has a significant moderating mediating effect on the relationship between social media competency and bootleg innovation behavior. This study helps organizations identify millennial employees' bootleg innovation behaviors (or other "spillover" or "deviant" behaviors) in the virtual workplace, and suggests effective management and governance mechanisms for these behaviors.

**Keywords:** social media competency, future work self-salience, informal role, bootleg innovation

## **1. Introduction**

In the digital economy, cross-organizations represented by bilateral and multilateral platforms, online communities, and ecosystems continue to emerge (Wei et al., 2021), and social media is widely used in the virtual workplace domain (such as Ding Talk, WeCom, Feishu, Yammer, LinkedIn, etc.). Most scholars have validated the positive impact of social media use in the workplace, where employees can connect and benefit from valuable knowledge exchange. For example, the popularity of virtual workplaces has expanded the reach of innovation sources, and external search for information and its integration in the context of open innovation is a practice that can increase success (Rauter et al., 2018). Social media as a virtual communication environment where the informal role of employees, their future work self-perceptions are reshaped due to differences in social media competencies.

The White Paper on Future Enterprise Efficiency released by International Data Corporation (IDC) predicts that by 2025, the Millennial will account for 75% of the global workforce (<https://www.docin.com/p-2448547099.html>). At present, the main body and motivation of innovation in many enterprises have been transferred to millennial employees, becoming the most active group of innovation vitality. Therefore, this study focuses on the innovation behavior of millennial employees.

It is inevitable that there will be spillover behaviors for millennial employees beyond their work connections, which may have an impact on their own work behaviors (normal and deviant) (Biliavska et al., 2022; Shukla & Kark, 2020; Tenzer & Yang, 2018; Xiao, 2020), such as seeking support for their bootleg innovative behaviors. However, the effectiveness of the use of social media and its impact on millennial employee behavior remains controversial due to the different social media competency of different millennial employees (Tsai & Bagozzi, 2014; Van Zoonen et al., 2016; Wushe & Shenje, 2019). Existing research has been focused on how social media changes and influences knowledge sharing activities (Gonzalez et al., 2013; Huang et al., 2021; Imron et al., 2021; Song et al., 2019), and there has been little research on the relationship between social media competency and millennial employee bootleg innovation.

The so-called "bootleg innovation" is relative to the normal innovation. Organizations give employees a high degree of autonomy to induce innovation, but also constrain them with organizational rules and processes, which can easily cause individual innovation to conflict with organizational R&D strategies and systems. If an individual firmly believes that his or her innovative vision is expected to bring benefits to the organization, then he or she may continue to carry out this innovative behavior covertly. Knight coined the term "bootlegging" to describe this kind of innovation behavior that conflicts with the organization (Knight, 1967). These behaviors are "deviant" compared with organizational norms and management, and are called bootleg innovation (Ford, 1996; Knight, 1967). Currently, scholars have

focused on bootleg innovation behaviors triggered at the individual, leadership, and organizational levels (Augsdorfer, 1996; Ghosh, 2015; Globocnik & Salomo, 2015; Lin et al., 2015; Podsakoff et al., 2006) within the framework of the "Ability-Motivation-Opportunity (AMO)" theory (Shin et al., 2014), with few studies based on bootleg innovative behavior in the virtual workplace.

Millennial employees' social media competency, informal role, and future work self-salience are important factors influencing work behavior. It is worth studying how organizations can identify "spillover" and "deviant" behaviors in the virtual workplace and establish effective management and governance mechanisms for these behaviors. Therefore, this paper investigates the influence of millennial employees' social media competency on bootleg innovation in the virtual workplace based on their informal role and future work self-salience.

## **2. Literature Review and Hypotheses Development**

### **2.1. The relationship between social media competency and bootleg innovation behavior**

In a given social context, social skills influence the choice of social roles, membership in social groups, and the social behavior of individuals (Mcfall, 1982). Organizations are complex social structures, and individuals with stronger social skills are stronger than others when they have more social connections (Friedman et al., 1980). Research has shown that social skills help gather social support and form friendship ties that lead to the flow of emotional resources to the focal individual (Cohen et al., 1986). And emotional ties are a better predictor of positive working relationships between individuals than instrumental ties (Casciaro & Lobo, 2008).

This is because, with a strong emotional bond, individuals will be more likely to convince others of the usefulness of their idea and, in turn, be able to obtain the peer support needed to implement the idea. This will increase the chances of successful implementation of creative ideas by millennial staffs involved in bootleg innovation. In order to implement an idea that has been rejected by their supervisor, millennial employees may need support from other stakeholders in the organization. This support can help core millennial employees in a variety of ways: for example, by providing emotional, social, and financial support, other types of resources, and collaboration with others. Millennial employees who engage in bootleg innovation and have stronger social skills are more likely to influence and even gain understanding and support from their colleagues, team members, and role-bearers in the organization (Frank & Stephen, 2001); conversely, millennial employees with weaker social skills will not receive the support they need to successfully implement their ideas, resulting in a lower chance of their ideas developing into innovative products. Therefore, in the case of weak social skills, millennial employees will have fewer bootleg innovation behaviors.

Social skills in the Internet era are more often reflected in social media competency. As a result, this study proposes hypothesis

*H1: Social media competency positively influences the bootleg innovation behavior of millennial employees.*

## **2.2. Relationship between social media competency and future work self-salience**

Future work self-salience is a motivational resource for individuals to change and improve themselves, which can stimulate the need for future resources, which in turn promotes individuals to proactively invest in existing resources to acquire other valuable resources (Strauss et al., 2012). According to conservation of resources theory (COR), individuals actively invest in resources in order to acquire new resources (Hobfoll et al., 2018). This includes acquiring important information resources from within and outside the organization. Once sufficient individual and work resources are available, individual emotional and behavioral motivation is activated (Bakker & Demerouti, 2008) and can facilitate individuals to implement proactive behaviors (Schmitt et al., 2016).

Social media provides a communication platform in which millennial employees can build networks of relationships, interact with information, and benefit from communication (gain valuable resources) in a work environment. In other words, social media competencies are individual traits and psychological perception traits that form cognitive interactions that include the perspectives of self and others, thus constantly sorting out and recognizing their current state, resources and capabilities. On this basis, they combine their ideals with reasonable expectations to estimate and realize the perception of their future working selves (Zhang et al., 2021).

Therefore, social media competency can have a greater impact on the formation of millennial employees' future-oriented self-perceptions. As a result, this study proposes the following hypothesis

*H2: Social media competency positively influences the future work self-salience of millennial employees.*

## **2.3. The relationship between future work self-salience and bootleg innovation behavior**

Individuals often ensure the balance and harmony of their cognitive appraisal system based on a dynamic self-concept (Cassar 2021; English & Chen, 2011; Kressmann et al., 2006). Cognitive appraisal is also closely related to personality traits. When self-concept and personality traits are aligned, motivation can better explain behavioral tendencies and outcomes.

The future work self plays an important role in creativity and innovation as an intrinsic motivator (Zhang et al., 2021). The future work self affects employees'

innovative ability in three ways. First, individuals who have a clear imagination of their future work self tend to have a higher sense of creative self-efficacy and identity than other employees (Puente - Diaz et al., 2020). Such employees will constantly seek to improve their abilities and qualities, actively seek breakthroughs and changes, strive to overcome habitual behaviors, and adopt creative approaches to achieve future goals that are consistent with their future work selves. Second, as an important motivational resource, the future work self can stimulate individuals to think creatively about future possibilities. The future work self shows strong intrinsic motivation for future work, interest in future work, and interest in the challenges constantly encountered in the pursuit of goals, thus enhancing employees' innovation (Zhang et al., 2021). Finally, the future work self not only provides directions for future development but also points to a clear development path, i.e., the future work self can reduce ambiguity and uncertainty in the process of improving innovation (Saetre & Brun, 2013).

Research suggests that future work self-salience helps shape the environment and boundary conditions needed for innovation. For example, employees' internal sense of identity, self-esteem, and self-management can motivate employees to produce more innovative behaviors (Unsworth & Mason, 2016). The self-concept gap between the present and the future motivates employees to continuously improve their capabilities and qualities. This process of self-improvement is often accompanied by high levels of innovation (Zhang et al., 2021). Future work self-salience has a positive predictive effect on individuals' innovative behavior (Qiu, 2014). This may also include bootleg innovative behaviors.

Therefore, this study proposes the following hypothesis

*H3: Future work self-salience significantly and positively affects bootleg innovation of millennial employees.*

Considering hypotheses 1-3 together, the hypothesis of the mediating role of future work self-salience is proposed.

*H4: Future work self-salience mediates the relationship between social media competency and bootleg innovative behavior of millennial employees.*

## **2.4. The moderating effect of informal role**

According to conservation of resources theory, employees with high informal status have a clearer sense of themselves (self-awareness) and a broader social support network, which facilitates access to the necessary physical, emotional, and cognitive resources to help individuals' better plan for their future work. They have a longer-term perspective, are more optimistic, and are better able to experience a greater sense of competence and to develop action plans to do so, working consistently and not giving up easily (Pettit et al., 2010). Therefore, millennial employees with high

informal role who have high social media competencies have higher future work self-salience. Therefore, the hypothesis H5 is proposed:

H5: Informal role of millennial employees positively moderates the relationship between their social media competency and their future work self-salience, i.e., the higher the informal role, the stronger the positive relationship between social media competency and future work self-salience.

On the other hand, increased informal role is usually accompanied by improvements in innovation capacity, innovation opportunities, and willingness to innovate (Liu et al., 2015). Future work self-salience helps shape the environment and boundary conditions needed for innovation. Employees' internal sense of identity, self-esteem, and self-management can motivate them to produce more innovative behavior (Unsworth & Mason, 2016). And high informal role gives individuals more self-esteem, self-confidence, influence, and job autonomy, which can lead to more cooperation and support in the organization, which in turn can have more influence on organizational management and operations (Magee & Galinsky, 2008). This may also include bootleg innovation with the nature of "underground" and "hidden" (Huang et al., 2017), and therefore, the millennial employees with high future work self-salience and high informal status have higher bootleg innovation behaviors. Accordingly, the hypothesis H6 is proposed:

H6: Informal role of millennial employees positively moderates the relationship between future work self-salience and bootleg innovation, i.e., the higher the informal role, the stronger the positive relationship between future work self-salience and bootleg innovation.

Hypothesis 2, 5, and 6 together constitute the mediating effect being moderated, i.e., future work self-salience has a mediating effect between social media competency and the bootleg innovation behavior of millennial employees, and the magnitude of this mediating effect depends on the level of informal role. Specifically, when the level of informal role is high, the stronger the relationship between social media competency and future work self-salience, the greater the influence of social media competency transmitted through future work self-salience on millennial employees' bootleg innovation behavior; when the level of informal role is low, the weaker the relationship between social media competency and future work self-salience, the greater the influence of social media competency transmitted through future work self-salience on millennial employees' bootleg innovation behavior. When the level of informal role is lower, the relationship between social media competency and future work self-salience is weaker, and the influence of social media competency transmitted through future work self-salience on millennial employees' bootleg innovation behavior is weaker.

Similarly, when the level of informal role is high, the relationship between future work self-salience and bootleg innovation is stronger, and the influence of

social media competency transmitted through future work self-salience on millennial employees' bootleg innovation behavior is greater; when the level of informal role is low, the relationship between future work self-salience and bootleg innovation is weaker, and the influence of social media competency transmitted through future work self-salience on millennial employees' bootleg innovation behavior is reduced. The influence of social media competency transmitted through future work self-salience on millennial employees' bootleg innovation behavior is also weakened. As a result, the hypothesis H7 is proposed:

H7: Informal status positively moderates the mediating effect of future work self-salience on the relationship between social media competency and bootleg innovative behavior, i.e., the mediating effect of future work self-salience in the relationship between social media competency and bootleg innovative behavior of millennial employees is more significant at higher levels of informal role.

In summary, this study uses millennial employees R&D technicians as research subjects to explore the mediating effect of future work self-salience in the relationship between social media competency and bootleg innovation through the lens of regulatory focus theory and resource conservation theory, and to test the moderating effect of informal role on this mediating effect by constructing a moderated mediation model (Figure 1).

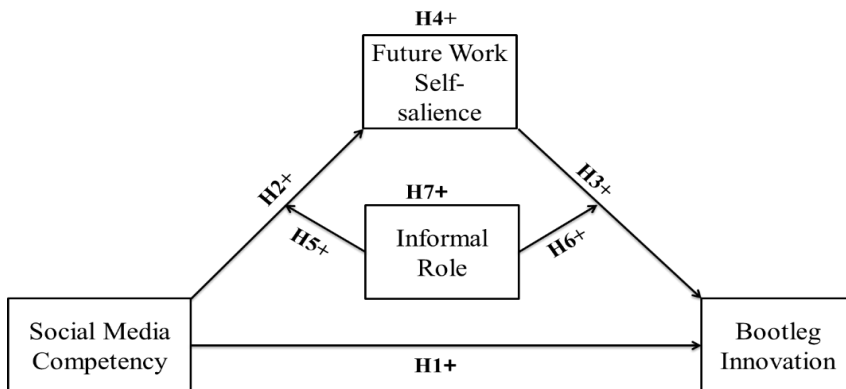


Fig. 1: Theoretical model

### 3. Data Collection and Variable Measurement

#### 3.1. Data collection

The data for this study were collected between July and August 2022, and the target population was millennial employees R&D technicians in the technology-based SMEs in the Yangtze River Delta region of China. By the end of 2021, the number of technology-based SMEs identified by the Ministry of Science and Technology of China has reached 130000 in the Yangtze River Delta region of China. It accounts for 40% of China's total. So it is representative. Through acquaintances (family members, friends, classmates, etc.), we entrusted the heads of the human resources

departments of 53 enterprises in the Yangtze River Delta as investigators. The questionnaire is distributed through online survey website (<https://www.wjx.cn/>). Therefore, the questionnaire survey data will be automatically collected through the system in real time, and there is no need to give special questionnaire distribution and recovery training to the survey personnel. The items of the study variables were all based on mature scales.

In this study, 500 questionnaires were sent out to 53 companies, and 387 valid team questionnaires were collected. The effective recovery rate was 77.4%. The specific statistical results are shown in Table 1.

Table 1: Statistical results

Title	Category	Frequency	Percentage (%)
Gender	Male	242	62.5
	Female	145	37.5
	Total	387	100
Age	25 and below	36	9.3
	26-30	150	38.8
	31-40	201	51.9
	Total	387	100
Educational Background	Junior college and below	55	14.2
	Bachelor's degree	287	74.2
	Master's degree and above	45	11.6
	Total	387	100
Position	general R&D technicians	189	48.8
	grassroots R&D managers	126	32.6
	middle-level R&D managers	57	14.7
	senior R&D managers	15	3.9
	Total	387	100
Stage of development	start-up stage	6	1.6
	development stage	160	41.3
	rapid expansion stage	115	29.7
	maturity stage	106	27.4
	Total	387	100

### 3.2. Variable measurement

To avoid the influence of semantic differences, this study adopted Brislin's (1986) suggestion of "translation-back translation" procedure for the adopted foreign research scales, i.e., the scales were first translated (English to Chinese) by two doctoral students in business, and then back-translated (Chinese to English) by a returnee scholar. And then the final version of the survey was discussed and revised against the translation and back-translation results. The questionnaires were



administered on a seven-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree).

#### (1) Social Media Competency

This paper uses a six-item scale developed by Gonzalez et al. (2013), which has a good internal consistency Cronbach's alpha coefficient of 0.808 and good reliability. Including items such as "I often use social media to discuss work items with stakeholders (colleagues, customers or suppliers)", "In social media working groups, people think I am a good opinion provider to solve problems", "Social media can make it easier for me to establish close contact with target groups", etc.

#### (2) Future Work Self-Salience

Future work self-salience was measured using a 5-item scale developed by Strauss et al. (2012), which has a good internal consistency Cronbach's alpha coefficient of 0.92 and good reliability. The scale contains items such as "I can easily imagine what my future work will be like" and "I am very clear about who and what I want to be in my future work", etc.

#### (3) Bootleg Innovation

In this paper, the eight-item bootleg innovation scale developed by Lin et al. (2015) was selected to highlight the presence of explicit and direct rejection pressure from the organization and management for bootleg innovation behavior. The scale has good reliability with an internal consistency Cronbach's alpha coefficient of 0.82. The scale contains items such as "I continue to pursue and develop these R&D ideas even though they are not approved by my superiors", "I often think about how to make unapproved ideas good", "I use part of my normal work time to continue to develop the rejected ideas", etc.

#### (4) Informal Role

The informal role of an individual in an organization is mainly represented through a composite approach of influence, prestige and network centrality (Kim et al., 2020; Pettit et al., 2010). In this paper, we chose the five-item scale developed by Huang et al. (2017), which has good reliability with an internal consistency Cronbach's alpha coefficient of 0.85. It contains items such as "I can give my opinion when I want to influence a decision", "I have a lot of influence on what happens in the team", "I am often asked for advice by leaders at work ", etc.

## **4. Data Analysis and Results**

### **4.1. Confirmatory factor analysis**

SPSS 26.0 with AMOS24 software was used for statistical analysis in this study. To test the construct differentiation of the variables involved in this study, confirmatory factor analysis was conducted on social media competency, future work self-salience, informal role, and bootleg innovation. The results of AMOS confirmatory

factor analysis are shown in Table 2, and the four-factor model with data fit ( $\chi^2/df=4.355$ , RMSEA=0.093; SRMR=0.0546; CFI=0.894; TLI=0.878) was the best and significantly better than the other models. This indicates that the four variables involved in this study do represent four different constructs.

Table 2: Confirmatory factor analysis

Models	$\chi^2$	df	$\chi^2/df$	RMSEA	SRMR	TLI	CFI
Four Factors	797.023	183	4.355	0.093	0.0546	0.878	0.894
Three factors	1588.491	186	8.540	0.140	0.0893	0.727	0.758
Second factor	1676.512	188	8.918	0.143	0.0932	0.713	0.743
One factor	2476.583	189	13.104	0.177	0.1172	0.562	0.605

Note: "+" means combined into one factor.

Four factors: social media competency, future work self-salience, informal role, bootleg innovation.

The three factors: social media competency + future work self-salience, informal role, bootleg innovation.

Factor two: social media competency + future work self-salience + informal role, bootleg innovation.

One factor: social media competency + future work self-salience + informal role + bootleg innovation.

## 4.2. Descriptive statistical analysis

Table 3: Correlation analysis

Variable	Mean	SD	1	2	3	4	5	6	7
Gender	0.37	0.485							
Age	2.43	0.657	-0.096						
Education	1.97	0.508	.113*	0.087					
Position	1.74	0.85	0.052	.276**	.146**				
social media competency	5.267	1.109	.202**	.107*	0.032	.211**			
future work self-salience	5.398	1.033	0.086	0.099	0.032	0.075	.518**		
Informal role	5.272	0.892	-0.069	.277**	0.043	.284**	.653**	.494**	
Bootleg innovation	4.566	1.153	0.014	0.05	0.043	.153**	.547**	.508**	.423**

Note: \* At the 0.05 level (two-tailed), the correlation is significant; \*\* at the 0.01 level (two-tailed), the correlation is significant.

The descriptive statistics mainly show the mean, standard deviation, and correlation coefficient of each variable (as shown in Table 3). In this study, gender,

age, educational background and position were set as control variables. Social media competency was significantly and positively correlated with future work self-salience ( $r=0.518$ ,  $p< 0.01$ ); social media competency was significantly and positively correlated with bootleg innovation ( $r=0.547$ ,  $p< 0.01$ ) and future work self-salience was significantly and positively correlated with bootleg innovation ( $r=0.508$ ,  $p< 0.01$ ). Some evidence is provided for further argument of the hypotheses in this study.

### 4.3. Common method bias test

The problem of common method bias arises from the questionnaire method of data collection. In this study, the Harman's single-factor test was chosen to test for common method bias, i.e., all items of the questionnaire were analyzed by non-rotation factor analysis, and the amount of variance explained by the first principal component was obtained as 24.116%, which was less than the critical criterion of 40% and did not account for half of the total variance explained (73.829%).

Considering that the Harman's single-factor test is an insensitive test, this study proceeds to adopt the latent error variable control method. In the structural equation model, common method bias was added as a latent variable to the model, and if the significant fit of the model with the inclusion of the method bias latent variable was better than that without the inclusion of the common method bias latent variable, then it indicated the existence of common method bias. The results of the analysis following the above steps are shown in Table 4. First, the confirmatory factor analysis model M1 was constructed, and second, the model M2 with the method factor was constructed. Comparing the main fit indices of model M1 and model M2, we obtained:  $\Delta\chi^2/df = 0.231$ ,  $\Delta IFI = 0.007$ ,  $\Delta TLI = 0.008$ ,  $\Delta CFI = 0.007$ , and  $\Delta RMSEA = 0.003$ . The changes of the fit indices were less than 0.003, indicating that the fit indices of the model did not become better but worse after adding the common method factor, indicating that the common method bias problem in this study is not significant (Podsakoff et al., 2003).

Table 4: Potential error variable control method to test for common method bias

Models	$\chi^2$	df	$\chi^2/df$	RMSEA	IFI	TLI	CFI
M1 (Model without common method bias factor)	797.023	183	4.355	0.093	0.895	0.878	0.894
M2 (model with common method bias factor)	834.583	182	4.586	0.096	0.888	0.870	0.887

#### 4.4. Hypotheses testing

All variables were normalized and all operations were done through the SPSS macro program Process 4.1.

##### 4.4.1. Mediating effect test

Table 5: Mediating effect test

Regression equation		Fitting index			Significance of regression coefficients		
Result Variables	Predictive variables	R	R <sup>2</sup>	F	$\beta$	SE	<i>t</i>
future work self-salience	social media competency	0.518	0.268	140.882	0.482	0.041	11.869***
bootleg innovation	social media competency	0.607	0.368	111.851	0.403	0.049	8.178***
	future work self-salience				0.343	0.053	6.483***

Note: \* indicates  $p < 0.05$ ; \*\* indicates  $p < 0.001$ ; \*\*\* indicates  $p < 0.0001$

Regression analysis was conducted using Model 4 of the SPSS macro program Process4.1 (as shown in Table 5) to test the mediating effect of future work self-salience between social media competency and bootleg innovation.

The results showed that social media competency was a significant direct predictor of bootleg innovation ( $\beta = 0.403$ ,  $P < 0.001$ ); while adding future work self-salience as a mediating variable, social media competency still significantly predicted bootleg innovation ( $\beta = 0.343$ ,  $P < 0.001$ ). Bootstrap test indicated that this mediating effect was significant with a 95% confidence interval of [0.221, 0.466], and the mediating effect was 0.166, accounting for 29.17% of the total effect (0.569). Hypotheses H1 to H4 were supported.

##### 4.4.2. Moderating effect test

To test the moderating effect of informal role in the mediating effect, this study took  $\pm 1$  standard deviation as the high and low values of the moderating variable and used Bootstrap method to test the difference in the mediating effect of the moderating variable at the two values (Hayes, 2018), and regression analysis was performed using Model 58, a model of SPSS macro program Process4.1 (Model 58 assumes that the mediating model was moderated in the first and second half of the model, consistent with the theoretical model of this study, after decentralization of the relevant data, the results are presented in Tables 6 and 7). The mediated model with moderation was tested while controlling for gender, age, education, and position. The results found that the interaction term of social media competency and informal role significantly and positively predicted future work self-salience after putting informal role into the model ( $\beta = 0.298$ ,  $p < 0.001$ ); the mediation effect was

significant when informal role was taken as -1SD and +1SD. The interaction term of future work self-salience and informal role significantly and positively predicted bootleg innovation ( $\beta=0.218$ ,  $p<0.001$ ); the mediating effect was significant when informal role was taken as -1SD and +1SD.

Table 6: Moderated mediation effect test

	Future Work Self-salience			Bootleg Innovation		
	coeff	se	t	coeff	se	t
constant	-0.285	0.229	-1.241	4.425	0.252	17.578** *
SMC	0.419	0.054	7.703***	0.371	0.061	6.116***
IR	0.432	0.067	6.467***	0.044	0.076	0.576
SMC*IR	0.298	0.041	7.233***			
FWSS				0.403	0.055	7.36***
FWSS*IR				0.218	0.049	4.455***
Gender	0.16	0.091	1.758	-0.19	0.102	-1.871
Age	0.031	0.067	0.464	-0.1	0.074	-1.342
EDU	0.109	0.083	1.31	0.111	0.092	1.211
Position	-0.148	0.052	-2.829*	0.078	0.058	1.35
R-sq	0.401			0.413		
F	36.313			33.267		

Note:(1) SMC: Social Media Competency; IR: Irregular Role; FWSS: Future Work Self-salience; (2) \* indicates  $p<0.05$ ; \*\* indicates  $p<0.001$ ; \*\*\* indicates  $p<0.0001$ .

Table 7: Moderated mediation effect at different levels of informal role and comparison

	Indicators	Effect	BootSE	BootLLC I	BootULCI
Moderated mediation effect	eff1(M-1SD)	0.032	0.021	0.002	0.083
	eff2(M)	0.169	0.035	0.107	0.244
	eff3(M+1SD)	0.409	0.077	0.269	0.573
Comparison of moderated mediation effect	eff2-eff1	0.137	0.026	0.089	0.19
	eff3-eff1	0.377	0.08	0.236	0.544
	eff3-eff2	0.24	0.057	0.143	0.365

Note: M-1SD indicates cases where the conditioning variable is below one standard deviation, and M+1SD indicates cases where the conditioning variable is above one standard deviation; Bootstrap sampling 5,000 times.

Under the regulation of different levels of informal status, the direct effect of social media competency on bootleg innovation is significant, and the indirect effect of social media competency on bootleg innovation is also significant, indicating that there is a moderated mediation effect in this model. In addition, according to the index value of the moderated mediation effect is 0.371, the 95% confidence interval

is  $[0.252, 0.490]$ , and the interval does not contain 0, it can be inferred that there is a significant moderated mediation effect in the model. Thus, the moderating effect of informal role was significant.

In order to give a complete picture of the indirect effects affected by the moderating variables (in this study, continuous variables). Using the Johnson-Neyamn method and the Bootstrap sampling method (Preacher et al., 2007), specific values for the 95% confidence bands and significant domains were calculated to provide a clearer picture of the indirect effects under continuous values of the moderating variable in graphical form (data is not centralized). The straight line in the figure represents the moderated effect for the dependent variable, which is a linear function of the moderating variable, and the dashed line represents the corresponding confidence band. As shown in Figure 2 and 3.

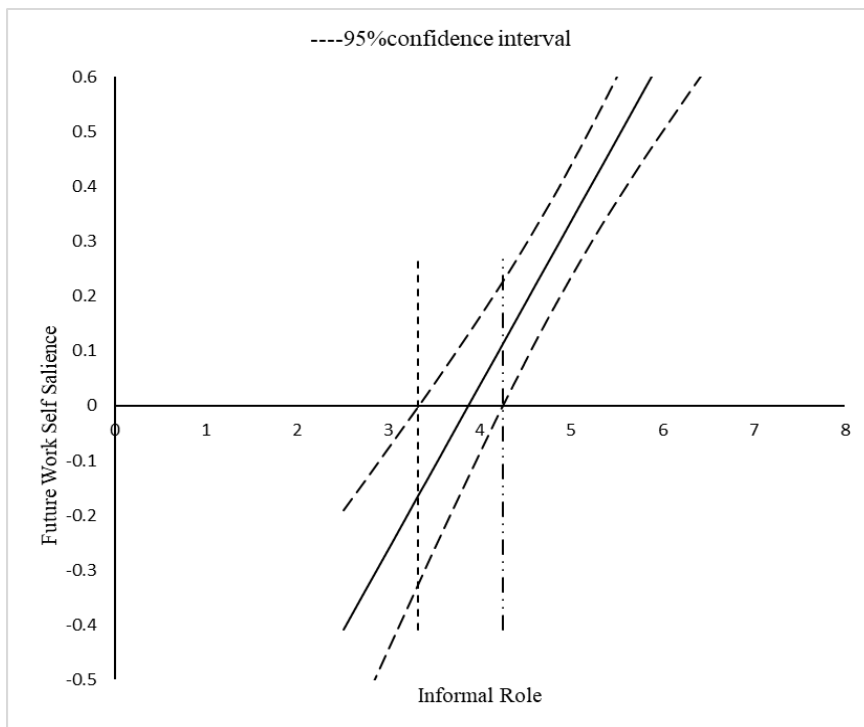


Fig.2: The moderating effect of informal role in the relationship between social media competency and future work self-salience

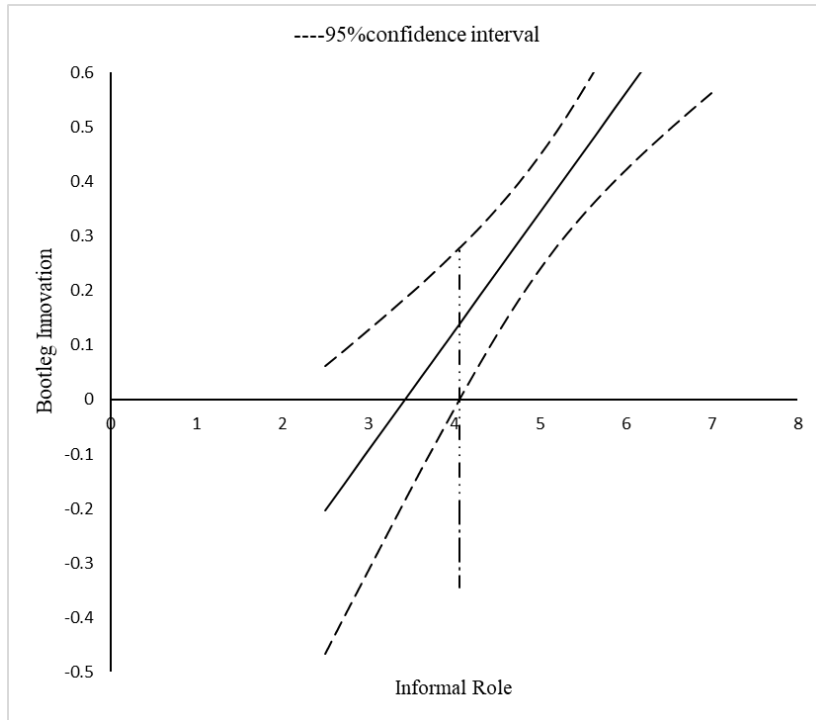


Fig.3: The moderating effect of informal role in the relationship between future work self-salience and bootleg innovation

As can be seen from Figure 2, when informal role is less than 3.324 and greater than 4.251 (7 out of 7, same below), it significantly affects the relationship between social media competency and future work self-salience. From Figure 3, it can be seen that when informal role is greater than 4.066, it significantly affects the relationship between future work self-salience and bootleg innovation.

In addition, the mediating effect of future work self-salience in the relationship between social media competency and bootleg innovative behavior tended to increase at all three levels of informal role (as shown in Table 6). That is, as the level of informal role increases, social media competency is more likely to induce bootleg innovative behavior by increasing the future work self-salience of millennial employees. Hypotheses H5 to H7 were supported.

## 5. Conclusion and Discussion

This study uses regression analysis based on the regulatory focus theory and resource conservation theory to analyze the mechanism of action between social media competency and bootleg innovation behavior in millennial employees' virtual workplace, and the results support the hypotheses and confirm the research framework established in this study.

## **5.1. Theoretical implications**

(1) This study enriches the study of antecedent variables of millennial employees' bootleg innovation behavior and confirms that social media competency is an important factor influencing millennial employees' bootleg innovation behavior.

(2) This study establishes a moderated mediation model, which integrates the influence of individual and organizational contextual factors, such as social media competency, future work self-salience, and informal role, on their bootleg innovation behaviors, and provides a deeper analysis of the underlying mechanisms of millennial employees' bootleg innovation behaviors. The results of the study show that the mediating effect of millennial employees' bootleg innovation is moderated by informal role, which indicates that the prediction of millennial employees' bootleg innovation behavior should pay more attention to the degree of millennial employees' future work self-salience, while paying due attention to their informal role in the organization, in order to effectively predict millennial employees' bootleg innovation behavior.

(3) This study further reveals that there are incentives other than material incentives for bootleg innovation behavior. For millennial employees, innovation is mainly motivated by company recognition and compensation incentives, while bootleg innovation is more motivated by learning, self-efficacy, peer recognition, career potential, and a sense of community belonging because of its "private" and "secretive" nature.

## **5.2. Practical implications**

First, this study found that millennial employees' future work self-salience plays a mediating effect in the process of social media competency to promote bootleg innovative behaviors. Therefore, organizations should establish a clear workplace promotion mechanism to improve the encouragement or recognition of millennial employees' innovation motivation; an organizational signaling system of encouragement, protection and feedback should also be formed for millennial employees' bootleg innovation behaviors to continuously consolidate their sense of organizational identity, strengthen long-term career planning and promote more innovative behaviors.

Second, millennial employees with high informal role are more likely to produce bootleg innovative behaviors. Therefore, organizations should focus on identifying and guiding the informal role of millennial employees when identifying their bootleg innovative behaviors. To this end, organizations need to specify the measurement criteria of informal role according to the actual situation and establish a clear management process for shaping the informal role of millennial employees, so as to reduce their innovative deviant behavior in the workplace and guide them to engage in innovation along the path planned by the organization.



Finally, bootleg innovative behavior is more motivated by learning, self-efficacy, peer recognition, career potential, and a sense of community belonging. Organizations need to use millennial employees' informal role as well as long-term career planning to balance between personal long-term planning and organizational innovation development, and guide them to change themselves from the inside out to eventually reach alignment with the organization in innovative behaviors.

### **5.3. Limitations and future research**

Of course, there are some shortcomings in this study; first, all data are based on a cross-sectional survey at the same point in time, leading to potentially weaker inferences of causal relationships between variables. Future studies can design longitudinal data collection to deeply analyze the causal relationship between each antecedent variable and bootleg innovation, thus providing better insights for theory and practice.

In addition, only the informal role of millennial employees was selected as a moderator variable in this study, but the practice of bootleg innovation behavior management contains many aspects, and more influencing factors should be explored for further exploration in the future.

Most of the researches view innovation behavior as a continuous behavioral variable, while according to Janssen (2000), innovation behavior includes three stages: proposing an idea, taking forward an idea, and implementing an idea, any of which can either constitute an innovation behavior independently or jointly with other stages to form an innovation behavior (Janssen, 2000). Therefore, the study of bootleg innovation behavior can be conducted in stages in the future.

According to some scholars (Chen et al., 2012), status striving motivation can be distinguished into “dominance-based status striving motivation” and “prestige based status striving motivation”. The current study did not collect sample data based on status competition motivation, and therefore did not find how the interaction between informal role and social media competency due to different status conferring methods affects the relationship between social media competency and future work self-salience, and how the interaction between informal role and future work self-salience affects the relationship between future work self-salience and millennial employees' bootleg innovative behavior. This issue could be explored in more depth in the future.

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