



RESEARCH ARTICLE

The influence of performance feedback frequency and affective commitment on the sunk cost effect

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The purpose of this study is to explore how combined effect of feedback frequency of investment performance and manager's affective commitment on reduction of the sunk cost effect. To this end, we designed an experimental questionnaire to collect data from production managers of electronics manufacturing companies listed on Taiwanese stock markets and used a hierarchical regression model to examine the relationships among variables. The results from 336 samples showed that just considering performance feedback frequency or affective commitment does not necessarily reduce the sunk cost effect. Only high feedback frequency jointed with high affective commitment can suppress the willingness of manager to continue a disadvantageous investment project.

1 | INTRODUCTION

Sunk costs of an investment project are the costs that have already been occurred and cannot be recovered in the project. It is an important concept in economics and management accounting and is an issue that researchers are keen to discuss when exploring the investment behavior of decision makers and investment performance (Dawes, 1988; Hilton, 2010; McAfee, Mialon, & Mialon, 2010). Because sunk costs cannot be recovered, sunk costs are not an opportunity cost of other investment options and should not affect the current and subsequent decisions (Bonini, 1977). However, many empirical studies have found that sunk costs do affect the investment decisions of decision makers (Arkes & Blumer, 1985; Dawes, 1988; Sharp & Salter, 1997; Yang, Cheng, & Ni, 2009). When a firm manager is unwilling to drop an unfavorable investment project owing to the invested costs (i.e., sunk costs)

and continues investing in it, this manager is having an irrational decision-making behavior called the sunk cost effect (Coleman, 2010; Keil et al., 2000; Sharp & Salter, 1997). Previous studies have mainly discussed the underlying causes of the sunk cost effect, such as cognitive dissonance (Chung & Cheng, 2018) and the possible moderators on the effect, such as project completion effect (Boehne & Paese, 2000; Jensen, Conlon, Humphrey, & Moon, 2011), information asymmetry (Shin, 2008), and decision types (Roth, Robbert, & Straus, 2015). However, there is a lack of empirical research exploring the causes for reducing the sunk cost effect. In dynamic performance measurement, performance management system as the tangible aspect and individual intrinsic motivation as the intangible aspect are two important components (Škec, Cash, & Štorga, 2017). In this study, we adopt performance feedback frequency as of a kind of performance management system and manager's affective commitment as of intrinsic motivation

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as moderators to examine their influences on reduction of the sunk cost effect.

Performance feedback frequency refers to how often performance feedback is provided (Lam, DeRue, Karam, & Hollenbeck, 2011). As to whether a high feedback frequency can lead to higher later performance, recent studies have not reached a consistent conclusion. Kuvaas, Buch, and Dysvik (2017) found that high immediacy and frequency of supervisor performance feedback improves the job performance of subordinates. Conversely, Casas-Arce, Lourenco, and Martienz-Jerez (2017) stated that because managers cannot digest too much information, an excessively high feedback frequency may be detrimental to their decision making or result in managerial myopia, thus cannot help improve later performance. Based on the argument, this study suggests that performance feedback frequency has a contingent effect on a manager's willingness to continue on with an investment project.

Assuming that a high performance feedback frequency does not necessarily enable managers to recognize the past invested costs as sunk and change their decision to continue investing in an unfavorable project (Casas-Arce et al., 2017), Anseel, Lievens, and Levy (2007) suggested that researchers should explore the extent to which individuals demonstrate self-motivation when receiving performance feedback interventions. The manager's affective commitment coming from satisfaction with the organization and job will motivate him (her) to respond to management feedback (Allen & Meyer, 1990). Although it is generally believed that affective commitment will positively influence job performance (Suliman, 2002; Boxall & Macky 2009), the empirical results are divergent (Khan, 2015). The affective commitment–job performance relationship is contingent to context (Wright & Bonett, 2002). In a meta-analysis, Riketta (2002) found at least marginally significant relationship between affective commitment and job performance for extra-role performance, white-collar workers, and performance assessed by self-ratings. However, moderators of commitment measure, job level, age, and tenure did not have at least marginally significant effects. Khan (2015) deemed that affective commitment cannot positively predict job performance due to lack of a systematic performance management system. Acknowledged from these points, we posit that if the managers have high affective commitment, due to emotional attachment to the organization (Meyer & Allen, 1991) and share interests with the organization (Abernethy, Bouwens, & Kroos, 2017), they will carefully assess the unfavorable performance information provided by the management and avoid continuously investing. Hence, the adverse psychological reaction of the sunk cost effect could be suppressed underlying a combined effect of performance feedback frequency and affective commitment.

The remainder of this paper is organized as follows: Section 2 reviews related literature and presents our hypotheses. Section 3 explains the research method. Results are presented and discussed in Section 4. Section 5 concludes this study with a summary of findings, managerial implications, research contributions, and limitations along with future research recommendations.

2 | LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1 | Performance feedback frequency and sunk cost effect

Performance feedback is a form of communication in which the firm's management provides past performance information to managers to help them with learning, growth, and development plans (Kuvaas et al., 2017). Although it is agreed in most research that performance should be fed back in a timely manner, and regular feedback contributes to learning and motivation (Ilgen, Fisher, & Taylor, 1979; Kopelman, 1986), prior research has inconsistent conclusions about the effect of performance feedback on improvement of later performance (Alvero, Bucklin, & Austin, 2001; Kluger & DeNisi, 1996). From the learning perspective, frequent feedback prompts managers to revise their beliefs and try new strategies (Schmidt & Dolis, 2009). From the motivation perspective, more feedback can increase a manager's sense of competence, leading him or her to believe that his or her actions can influence performance (Casas-Arce et al., 2017; Ilgen et al., 1979). However, some studies found that when managers receive too much feedback information, they may suffer information overload (Casas-Arce et al., 2017; Chenhall & Morris, 1986; Chia, 1995) or are unable to process the information (Chong, 1996) or be guided toward managerial myopia (Gigler, Kanodia, Sapra, & Venugopalan, 2014). Therefore, they suggested that although high performance feedback frequency offers prompt information for decision making, it does not necessarily improve the effectiveness of decision making.

These views suggest that managers may have different behaviors when receiving performance feedback. On one hand, given a high performance feedback frequency, managers will pay more attention to the possible losses in an investment project from the adverse information provided by the management and then revise their investment decision (Kuvaas et al., 2017). Thus, the more the adverse information about an unfavorable project is provided, the less willing the managers are to continue investing in the project. On the other hand, in the setting of a high performance feedback frequency, managers may focus on short-term performance and engage in earnings management (Van der stede, 2000). While the managers recognize the unfavorable investment and cease investing in it, there will be immediate losses. As a result, they will be reluctant to stop a bad investment project. From the above discussions, frequency of performance feedback does not necessarily affect managers' willingness to continue investing and the sunk cost effect.

2.2 | Effect of performance feedback frequency and affective commitment on sunk cost effect

In the organizational setting, affective commitment refers to an employee's affective attachment and recognition of the organization (Allen & Meyer, 1990). In terms of the willingness of employees to

contribute to the organization, only employees with affective commitment are willing to invest more time, energy, and talent for the organization (Reichers, 1985). Employees' affective commitment comes from the feeling of having a comfortable relationship with their organization, which is related to organizational dependability and management receptiveness, as well as a sense of competence for the job, which is associated with work challenge, participation, feedback, and goal difficulty (Allen & Meyer, 1990). Wickramasinghe and Wickramasinghe (2012) mentioned that personal decision making is closely related to individual affective commitment. Liu and Mattila (2015) investigated the impact of affective commitment, feedback valence, and feedback use on the willingness of customers to provide feedback following a service failure. Their finding showed that customers who have a high affective commitment to a service firm tend to have a strong motivation to help the firm improve its business and to maintain a positive relationship with the firm's frontline employees. In addition, affectively committed customers are more willing to help the company by lodging complaints and offering constructive suggestions. Weiss and Cropanzano (1996) argued that when employees have affective commitment in the workplace, they demonstrate positive attitudes and behaviors to perform better on their jobs. Managers with affective commitment will identify with the organization and view organizational interests as their own interests, so they will not do harm to the organization for their own benefit when dealing with a decision-making dilemma (Abernethy et al., 2017). Therefore, an individual's affective commitment to an organization will bring positive behaviors toward the organization.

From these viewpoints, we argue that performance feedback frequency alone is not enough for explaining or predicting a manager's correction response to sunk costs and subsequent investment decisions. We need to consider the manager's affective commitment to his (her) organization as well. High performance feedback frequencies may only lead to earnings manipulation for short-term performance and are not helpful for detecting an unfavorable investment project at earlier stage (Gigler et al., 2014; Van der Stede, 2000). Meanwhile, if the manager has affective commitment, he or she will look for problems in the project based on the given information (Chong, 1996) and carefully review the effectiveness of capital expenditures, so a bad investment project can be terminated early (Nouri & Parker, 1996). Gigler and Hemmer (1998) found that the higher the frequency of required financial reporting, the greater the impact of the reporting on investors' stock purchase decision. It can be inferred that high performance feedback frequencies will affect managers' investment decisions more greatly than low ones. However, even the management provides performance feedback at a high frequency, if the manager has low affective commitment, the manager may still focus on self-interest and try to recover sunk costs or even take a risk to continue a disadvantageous investment project. In contrast, if the manager has high affective commitment, he or she will carefully evaluate the investment project (Abernethy et al., 2017). Supposing the project is likely to cause significant losses, the manager will consider organizational interests and be reluctant to continue investing. Therefore, performance feedback frequency alone is not enough to suppress the

sunk cost effect, but when managers have high affective commitment under frequent performance feedback, they will be more likely to pay greater attention to the sunk costs and organizational interests, thus reducing their willingness to continue a harmful investment project. Based on above discussion, we propose the following hypotheses:

Hypothesis 1. *Sunk costs, performance feedback frequency, and affective commitment have an interaction effect on manager's willingness to continue a disadvantageous investment project.*

Hypothesis 2. *In the context of high performance feedback frequency, manager's high affective commitment can reduce the effect of sunk costs on his or her willingness to continue a disadvantageous investment project.*

3 | METHOD

3.1 | Participants and questionnaire

We conducted an experimental survey to validate the proposed hypotheses. The subjects were production managers in companies of the electronics manufacturing industries, including semiconductor, optoelectronic, communication network, computer peripheral, and electronic component, which were listed on stock markets in Taiwan. A total of 920 companies were selected, and production managers in these companies were invited to participate in the survey. The participating managers were assigned to one of the experimental scenarios, which were designed based on the combinations of four sunk cost levels and four performance feedback frequencies. The experimental questionnaire consisted of three main parts and a cover letter including a form of participants' informed consent. The questionnaire was sent to the production managers through the company's personnel department; 1 week after the questionnaires were distributed, we asked the managers by phone if they received the questionnaire and started to answer the questions. We gave them a second call in the third week to remind them to respond the questionnaire. We also gave another call to those who had not returned their responses. A total of 341 responses were returned, and five were excluded for incomplete answer, resulting in 336 valid responses and an effective recovery rate of 36.5%; 94.8% of the respondents have a bachelor's degree or above, 74% have been working in the current company for 5–16 years, and 83.8% are aged 31 to 50. The respondents came from five different electronics manufacturing industries. The demographics of the respondents are shown in Table 1.

3.2 | Experimental scenario and procedure

The experimental materials were mainly adapted from Keil, Mixon, Saarinen, and Tuunainen (1995) and modified according to the research design of this study. A similar approach was also adopted in

TABLE 1 Demographics of the respondents

Variable		N	%
Education	High school or vocational school	17	5.2
	Bachelor's degree	240	71.4
	Master's or doctorate degree	79	23.4
Duration of service in the company (tenure)	Below 5	29	8.6
	5–10	75	22.1
	11–16	174	51.9
	17–22	44	13.2
	Over 22	14	4.2
Age	20–30	38	11.2
	31–40	172	51.1
	41–50	109	32.7
	51–60	17	5.0
Industry	Semiconductor	80	23.8
	Optoelectronic	68	20.2
	Communication network	62	18.7
	Computer peripheral	58	17.1
	Electronic component	68	20.2

Chung and Cheng (2018). All the managers were required to be responsible for an investment project that involves production of an innovation product in their company, and their personal rewards are closely related to the project performance. The project has a budget limit of \$100 million and has to be completed in 18 months. In terms of the capital invested (i.e., sunk costs), there are four conditions, each representing an input level (i.e., a completion ratio). In terms of performance feedback frequency, there are four different intervals. After reading the information on the completion ratio and the performance feedback interval in a given scenario, managers were informed that a competitor has released a similar product on the market at an affordable price, which has more features and functions than the product they are developing now. Based on the given information, they were asked to decide the degree to which they are willing to continue investing in the project. This psychological reaction comes from a judgment made by the manager according to comprehensive perceptions of the scenario.

3.3 | Measure and analysis

3.3.1 | Sunk costs

Sunk costs refer to the costs that have been invested into an investment project. In our experiment, there are four levels of sunk costs represented by completion ratio, including 15%, 40%, 65%, and 90%. This measurement method was also used by Chung and Cheng (2018). The higher the completion ratio, the more the sunk costs. The

numbers of valid respondents in each group of sunk costs level are 86, 85, 82, and 83, respectively.

3.3.2 | Performance feedback frequency

Performance feedback frequency was operationally defined as how often the performance feedback of the investment project is provided. Normally, companies provide the financial report on a regular basis each year. Some companies offer it every 3 months, some once every 6 months, and some only provide an annual report. Based on this idea, we considered four investment performance feedback intervals, including 3, 6, 9, and 12 months. Shorter intervals represent higher feedback frequencies. The numbers of valid respondents in each group of feedback interval are 82, 84, 90, and 80, respectively.

3.3.3 | Willingness to continue investing in the project

We defined the willingness to continue investing in the project as a manager's willingness to continue a disadvantageous investment project. The willingness was measured on a scale from 0% to 100%, where 0% signifies "definitely unwilling to continue," and 100% indicates "definitely willing to continue" as used in Chung and Cheng (2018).

3.3.4 | Affective commitment

Affective commitment was defined as the extent to which the manager is affectively attached to the organization. It was measured by eight items adapted from Allen and Meyer's (1990) affective commitment scale. The items were designed to be rated on a 7-point Likert scale,¹ from 1, *strongly disagree*, to 7, *strongly agree*. The fourth, fifth, sixth, and eighth items were reverse questions, so the scores for these items were reversed for coding. The reliability analysis yielded a Cronbach's alpha value of 0.876. In addition, the exploratory factor analysis results showed that the eight items only converge in one component with an eigenvalue of 4.8, 60.755% of variances explained, and have factor loadings ranging from 0.714 to 0.829. The reliability and factor analyses indicated that the affective commitment scale has internal consistency and unidimensionality. The higher the total score of all items, the stronger the affective commitment of managers.

3.3.5 | Control variable

With regard to the three demographic variables of this study, age, education, and tenure, possibly affecting a manager's propensity to exhibit the sunk cost fallacy, Roth et al. (2015) and Strough, Mehta, McFall, and Schuller (2008) have reported that older people are less

TABLE 2 Comparing mean of willingness to continue investing by sunk costs and performance feedback frequency

SUNK					INTERVAL				
Completion ratio	N	M	SD	Mean comparison	Month	N	M	SD	Mean comparison
15%	86	0.265	0.232	$F = 8.504^{**}$ $p = .000$	3	82	0.472	0.243	$F = 19.957^{**}$ $p = .000$
40%	85	0.396	0.149		6	84	0.345	0.182	
65%	82	0.470	0.188		9	90	0.263	0.156	
90%	83	0.502	0.289		12	80	0.598	0.226	
Total	336	0.405	0.238		Total	336	0.405	0.238	

Note. INTERVAL, performance feedback frequency; SUNK, sunk costs.

** $p < .01$.

susceptible to the sunk cost effect than younger ones. Roth et al. (2015) demonstrated that employees who are highly familiar with decision making due to better education and long-term job training cannot effectively reduce the sunk cost effect. Therefore, education and tenure are not important measures; this study only uses age as a control variable.

3.3.6 | Analysis method

We analyzed the interaction effect among variables using a hierarchical regression model. According to Jaccard, Turrissi, and Wan (1990), the product term in the regression equation can be used for judging the existence of interaction effect. If the product term is significant, there is an interaction effect. In addition, we processed the raw data using the centering approach to avoid the collinearity problem between independent variables (Cronbach, 1987). The centralized score is the difference between original value and average value of

TABLE 3 Descriptive statistics

Variable	Minimum	Maximum	M	SD
AGE	21	56	38.310	7.081
SUNK	0.15	0.90	0.525	0.288
WILLINGNESS	0.00	1.00	0.405	0.238
INTERVAL	3	12	7.623	3.257
AFFECTIVE	8	56	31.524	8.241

Note. AFFECTIVE, affective commitment; INTERVAL, performance feedback frequency; SUNK, sunk cost; WILLINGNESS, willingness to continue investing.

TABLE 4 Correlation analysis

Variable	AGE	SUNK	WILLINGNESS	INTERVAL
SUNK	0.002			
WILLINGNESS	-0.114	0.371**		
INTERVAL	-0.177*	-0.019	0.104	
AFFECTIVE	-0.153	-0.021	-0.097	0.136*

Note. AFFECTIVE, affective commitment; INTERVAL, performance feedback frequency; SUNK, sunk cost; WILLINGNESS, willingness to continue investing.

* $p < .05$; ** $p < .01$.

the variable, that is, the variable coordinates are converted from zero to the average. According to Southwood (1978), linear transformation will not change the coefficient, standard deviation, and significance of the highest order product term nor will it affect R and F values of the regression model, but after transformation, the coefficients of low-order items cannot be interpreted in a meaningful way.

4 | RESULTS

4.1 | Manipulation check

Our manipulation of sunk costs and performance feedback frequency was checked by comparing the mean of the willingness to continue investing in the project. As shown in Table 2, there is a significant difference in the mean across the four levels of sunk costs ($F = 8.504$, $p < .01$), and the higher the completion ratio, the greater the mean. This implies that managers' willingness is subject to the sunk costs, and the higher the invested costs, the greater the willingness is affected. There is also a significant difference in the mean among four performance feedback intervals ($F = 19.957$, $p < .01$). Therefore, both sunk costs and performance feedback frequency were effectively manipulated for the experiment.

4.2 | Descriptive statistics and correlation analysis

The values of minimum, maximum, mean, and standard deviation for each variable are shown in Table 3. From the mean of willingness to continue investing (0.405), we can observe that the managers are not

TABLE 5 Regression analysis results of sunk costs, performance feedback frequency, and affective commitment on willingness to continue investing

Model	Item	Coefficient	Model 1			Model 2			Model 3					
			Est.	SE	t	p	Est.	SE	t	p	Est.	SE	t	p
	Constant		0.404**	0.018	22.523	.000	0.405**	0.016	25.483	.000	0.398**	0.015	26.249	.000
	X ₁		-0.038	0.023	1.627	.106	-0.056**	0.021	2.638	.009	-0.045*	0.020	2.197	.030
	X ₂		0.314**	0.064	4.912	.000	0.299**	0.057	5.249	.000	0.317**	0.054	5.857	.000
	X ₃		0.010	0.006	1.752	.082	0.010	0.005	1.873	.063	0.009	0.005	1.849	.067
	X ₄		-0.002	0.002	-0.994	.322	-0.004	0.002	-1.917	.057	-0.002	0.002	-1.193	.235
	X ₂ × X ₃						0.001	0.001	1.079	.282	0.001	0.001	1.057	.313
	X ₂ × X ₄						-0.007	0.006	-1.083	.221	-0.006	0.007	-0.887	.376
	X ₃ × X ₄						0.004*	0.002	2.210	.030	0.003*	0.001	2.507	.013
	X ₂ × X ₃ × X ₄										0.008**	0.002	4.060	.000
			R ² = 0.175, Adj R ² = 0.152, F = 7.587 (p = .000).			R ² = 0.367, Adj R ² = 0.335, F = 11.599 (p = .000), ΔR ² = 0.192, ΔF = 14.155 (p = .000)			R ² = 0.434, Adj R ² = 0.402, F = 13.332 (p = .000), ΔR ² = 0.067, ΔF = 16.485 (p = .000)					

Note. Dependent variable: Willingness to continue investing.
* p < .05; ** p < .01.

highly willing to continue investment, implying that they have the sense that the investment project is not favorable. In Table 4, the results of Pearson correlation analysis² present a significant and positive coefficient between sunk costs and willingness to continue investing (0.371, $p < .01$). This confirms the existence of the sunk cost effect in our experimental setting. However, both sunk costs and willingness to continue investing are not significantly related to performance feedback frequency as well as affective commitment. This implies that performance feedback frequency and affective commitment have no direct relationship with the sunk cost effect, respectively.

4.3 | Hypothesis testing

We applied the multiple regression analysis with the following equation to test the interaction effect of sunk costs, performance feedback frequency, and affective commitment on willingness to continue investing as stated in Hypothesis 1.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_2 X_3 + \beta_6 X_2 X_4 + \beta_7 X_3 X_4 + \beta_8 X_2 X_3 X_4 + \varepsilon.$$

where Y is the willingness to continue investing, X₁ is the age after centering, X₂ is the sunk costs after centering, X₃ is the performance feedback frequency after centering, and X₄ is the affective commitment after centering ($\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7$, and β_8 are regression coefficients; ε is the error term).

As shown in Table 5, the results of regression analysis indicate that all the three models have significant F value and good explanatory power (R^2 and ΔR^2). In Model 2, the product term X₂ × X₃ is not significant ($\beta_5 = 0.001, p > .1$), suggesting that performance feedback frequency does not interact with sunk costs to affect the manager's willingness to continue an investment project. The result confirms that performance feedback frequency does not alone affect the sunk cost fallacy. In addition, the product term X₂ × X₄ is not significant also ($\beta_6 = -0.007, p > .1$), showing that affective commitment does not interact with sunk costs alone to influence the willingness to continue investing. In Model 3, because the coefficient of the highest order product term X₂ × X₃ × X₄ is significant ($\beta_8 = 0.008, p < .01$), it

TABLE 6 Comparing mean of affective commitment by performance feedback frequency

Months	N	Affective commitment		
		M	SD	Mean comparison
3	82	29.317	9.176	F = 3.271* p = .034
6	84	28.926	6.182	
9	90	33.265	7.356	
12	80	31.938	9.696	
Total	336	31.524	8.241	

* p < .05.

TABLE 7 Regression analysis results of sunk costs, affective commitment, and interaction effects on willingness to continue investing under four performance feedback intervals

Model	Coefficient	Estimate	SE	t	p
3-month interval (n = 82)					
Constant	β_0	0.465**	0.036	12.878	.000
Age	β_1	-0.079	0.054	-1.454	.157
Sunk costs	β_2	0.395**	0.139	2.841	.008
Affective commitment	β_3	-0.010*	0.004	-2.483	.011
Sunk costs × Affective commitment	β_4	-0.050**	0.018	-2.777	.009
$R^2 = 0.397$, Adj $R^2 = 0.314$, $F = 4.771$ **, $p = .004$					
6-month interval (n = 84)					
Constant	β_0	0.376**	0.031	12.174	.000
Age	β_1	-0.019	0.036	-0.517	.609
Sunk costs	β_2	0.285**	0.100	2.848	.008
Affective commitment	β_3	-0.002	0.005	-0.420	.678
Sunk costs × Affective commitment	β_4	-0.022*	0.011	-2.010	.047
$R^2 = 0.355$, Adj $R^2 = 0.266$, $F = 3.992$ **, $p = .011$					
9-month interval (n = 90)					
Constant	β_0	0.280**	0.012	23.699	.000
Age	β_1	-0.037*	0.015	-2.425	.020
Sunk costs	β_2	0.494**	0.043	11.389	.000
Affective commitment	β_3	0.000	0.002	0.042	.966
Sunk costs × Affective commitment	β_4	-0.002	0.006	-0.387	.701
$R^2 = 0.785$, Adj $R^2 = 0.765$, $F = 38.362$ **, $p = .000$					
12-month interval (n = 80)					
Constant	β_0	0.577**	0.027	21.404	.000
Age	β_1	-0.018	0.050	-0.359	.722
Sunk costs	β_2	0.647**	0.093	6.954	.000
Affective commitment	β_3	-0.001	0.003	-0.331	.743
Sunk costs × Affective commitment	β_4	0.011	0.012	0.902	.375
$R^2 = 0.636$, Adj $R^2 = 0.584$, $F = 12.210$ **, $p = .000$					

Note. Dependent variable: Willingness to continue investing; all independent variables were centered.

* $p < .05$; ** $p < .01$.

confirms that there is an interaction effect of sunk costs, performance feedback frequency, and affective commitment on willingness to continue investing. The result thus supports Hypothesis 1.

Before further testing the impact of affective commitment on the sunk cost effect at different performance feedback intervals, this study compared the mean of affective commitment by different feedback periods. The result shown in Table 6 indicates that there is a significant difference in affective commitment across the four intervals ($F = 3.271$, $p < .05$).

To verify the interaction effect of sunk costs and affective commitment on willingness to continue investing under different performance feedback intervals, we divided the sample into four groups, including 3, 6, 9, and 12 months. The results are shown in Table 7. First, in each of performance feedback interval, there exists the significance of sunk cost effect (β_2), and a tendency is that the longer the feedback period, the greater the sunk cost effect. In 3-month interval,

the impact of affective commitment on willingness to continue investing is significant ($\beta_3 = -0.01$, $p < .05$). Moreover, the product term of sunk costs and affective commitment is significant ($\beta_4 = -0.05$, $p < .01$). In 6-month interval, the product term of sunk costs and affective commitment is also significant ($\beta_4 = -0.022$, $p < .05$). However, the product terms for 9- and 12-month intervals are not significant. It concludes that in the 3-month feedback interval, affective commitment has a greater impact on reduction of the sunk cost effect. So the research results support Hypothesis 2.

5 | CONCLUSIONS

When making investment decisions, firm managers are often affected by the sunk cost effect to become unwilling to give up an unfavorable investment project, thus resulting in huge losses. In this study, we

explored how to reduce the sunk cost effect and argued that the performance feedback frequency of an investment project and the affective commitment of managers are factors that can moderate this effect. We analyzed whether performance feedback frequency, affective commitment, and sunk costs form a three-way interaction effect that influences manager's willingness to continue investing. Our findings confirm that the three variables have a three-way interaction effect on manager's willingness to continue an unfavorable investment project, thus demonstrating that performance feedback frequency combined with affective commitment influences the sunk cost effect. More specifically, only when management implements high performance feedback frequency and managers have high affective commitment can reduce the sunk cost effect.

Our results offer significant managerial implications and suggestions. Through the performance feedback mechanism, firm management regularly delivers quantitative and qualitative information of performance to the manager in order to ensure that the organization operates in the expected direction or to eliminate the factors that may cause a failure of the organization. However, we found that frequent performance feedback is not effective in preventing managers from being affected by the sunk cost effect, which can only be reduced when the manager has high affective commitment simultaneously. So when planning the strategy for mitigating the sunk cost effect, firm management cannot simply rely on using the performance feedback system. It is necessary to consider manager's affective commitment as a salient factor to suppress the effect. This study has a number of contributions. First of all, as previous studies, the sunk cost effect does exist to significantly influence managers' investment decision. Our findings suggest that using a performance feedback system combined with stimulating managers' affective commitment can reduce this negatively psychological effect. Second, the results provide a possible explanation for why previous studies have inconsistent results regarding the effect of high performance feedback frequency on later performance (Casas-Arce et al., 2017 vs. Kuvaas et al., 2017) and point out that affective commitment is another necessary condition for improving performance. Meanwhile, the survey results support Khan's (2015) argument that the lack of an effective performance management system such as performance feedback system is the reason why affective commitment cannot improve job performance. Fourth, in the practical aspect, this study provides an important reference that can guide firm management to design performance feedback system and employee motivation to reduce the sunk cost effect.

This study is subject to some limitations, which can be addressed in future research. Because all the items of the questionnaire were answered by managers individually, the common method variance from the same-source bias might exist in this study. However, through the design of reverse questions in the questionnaire and use of anonymity for the respondents, common method variance is less likely a problem in this study (Podsakoff, MacKenzie, & Podsakoff, 2003). However, future research is suggested to adopt a qualitative approach to interview managers and compare the findings with those of this study. Among the behavioral variables that influence the performance feedback recipients, future researches can incorporate personality

traits such as locus of control, work experience, and rewards related to project performance to gain deeper insights into individual response to feedback information and their subsequent decision-making behaviors.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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ENDNOTES

- ¹ From comparing reliability, validity, discriminating power, and respondent preferences in rating scales, Preston and Colman (2000) found that the 7-point scale is superior to other response categories in most of these aspects.
- ² Pearson correlation analysis applies to both continuous and interval variables (Chen & Popovich, 2002). Because sunk costs, performance feedback frequency, and willingness to continue investing are interval variables, and affective commitment and age are continuous variables, it is viable to calculate Pearson correlation coefficients among them.

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