

# The Impact of New Product Development Failure on Entrepreneur's Project Management Performance: A Study based on Event System Theory

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## Abstract

New product development is the core activity of startup enterprises. The failure of new product development projects is a specific type of scenario in which entrepreneurial failures occur. The current research on entrepreneurial failure clarifies the important value of entrepreneurial failure, discusses the formation mechanism of entrepreneurial failure learning, but lacks understanding of entrepreneurs' behavioral rules after failure, and lacks research on behavioral outcomes after failure. Based on the event system theory (EST), this study focuses on the specific situation of "new product development project failure" of entrepreneurial enterprises, quantifies the new product development failure event into a continuous variable and introduces it into the theoretical model, deeply explores the impact of the essential attribute of the event on the performance of entrepreneurial project management and conducts empirical tests. The research shows that event novelty has a negative impact on the project management performance of entrepreneurs, event criticality has a positive impact on the project management performance of entrepreneurs, and event origin negatively regulates the relationship between event novelty and project management performance of entrepreneurs. From the perspective of situational learning, the behavioral response of entrepreneurs after entrepreneurial failure is the practical application of knowledge learned from failure, an important part of learning from failure, and an important embodiment of the learning value of entrepreneurial failure.

## Keywords

**New Product Development; Entrepreneurial Failure; Learning from Failure; Project Management; Event System Theory.**

## 1. Introduction

The manifestation of entrepreneurship at the enterprise level is the continuous pursuit of high-risk opportunities. Specifically, it is to develop new products, enter new markets or explore new technologies [1]. New product development is the main means for enterprises, especially start-ups, to establish instant advantages, is the decisive factor of their competitive advantages, and is crucial to the growth of enterprises [2].

New product development is essentially an experiment on unknown results [3]. With risks and uncertainties, it is difficult for organization members to fully grasp market information and formulate effective plans in advance at the beginning of product development [2]. Therefore, most new product development projects end in failure [4]. Most entrepreneurs maintain their intention to re-establish after business failure, and entrepreneurial intention is a necessary condition for the formation of new business and continuous entrepreneurship [5]. However, few studies focus on the project management performance of entrepreneurs after failure in new business. Previous relevant studies have clarified the important value of entrepreneurial failure

[3] and explored the formation mechanism of entrepreneurial failure learning [6], but there is insufficient understanding of the rules of entrepreneurs' behavior after failure, and there is a lack of research on the results of behavior after failure. From the perspective of situational learning, the behavioral response of entrepreneurs after entrepreneurial failure is the practical application of knowledge learned from failure, and is an important embodiment of the learning value of entrepreneurial failure.

In addition, previous studies mostly used the internal characteristics of entities (such as cognition, emotion, etc.) as antecedent variables, and paid too much attention to the connotation and relationship of the internal characteristics of entities, but few studies explored the impact process of event attributes on entities from the perspective of the failure event itself. In fact, events in situations have been considered as a new research perspective that is different from the internal characteristics of entities (such as individuals, teams and organizations) [13]. This study focuses on the specific situation of "NPD project failure" of entrepreneurial enterprises, and defines the failure of new product development projects as the end of new product development projects that the company's entrepreneurs expect to create organizational value but fail to achieve the expected goals [3], The specific operation is the subjective perception of the entrepreneurs (decision-makers) responsible for the new product development project that the new product development project has not achieved its expected objectives. There are three reasons for the failure of new product development projects. First, new product development is the core activity of entrepreneurial enterprises. For start-ups, the success or failure of new product development is the decisive factor of their competitive advantage, which is very critical. Secondly, compared with other entrepreneurial failure scenarios, the loss of new product development project failure to entrepreneurial enterprises is moderate. Compared with the bankruptcy, liquidation or bankruptcy of enterprises, after the failure of the new product development project, the core resources remain in the organization, which will not bring irreparable losses to the start-up enterprises, and the disruption is moderate. Finally, the failure of new product development projects is a corporate entrepreneurship phenomenon. Compared with other entrepreneurial failure scenarios, project failure is more closely related to the subsequent entrepreneurial activities of entrepreneurs. New product development project is a trial and error means for corporate entrepreneurs to explore technology or market uncertainty. Compared with other failure scenarios such as financing failure, project failure scenarios carry more information about opportunities and are highly novel.

Based on the event system theory [8], this study quantifies new product development failure events into continuous variables and introduces them into the model to explore the impact of the essential attributes of events (event intensity and event space) on the performance of entrepreneurs' project management. Specifically, this study discusses:

- (1) The main effect of event intensity (novelty, disruption and criticality) on entrepreneurs' project management performance;
- (2) The regulatory effect of event space (event origin) on the main effect.

## 2. Literature and Theory

### 2.1. Entrepreneurship Failure

The definition of entrepreneurial failure in previous studies can be divided into three categories: first, entrepreneurial failure is equated with enterprise closure, which is often criticized by the academic community because it includes the situation that entrepreneurs actively close enterprises; The second is to define entrepreneurial failure as business failure, that is, the situation in which entrepreneurial enterprises are forced to stop because they cannot reach their goals or cannot repay their debts; The third is to define entrepreneurial failure as a staged

situation or fact that the entrepreneurial enterprise fails to achieve the expected goals in the process of creating or managing the enterprise [7]. The entrepreneurial activity is full of uncertainty, and the entrepreneurial process is full of setbacks and obstacles. Defining entrepreneurial failure as a staged scenario is more suitable for characterizing entrepreneurial theory and practice.

Entrepreneurial failure is the inevitable outcome of most entrepreneurial activities [4]. The early entrepreneurial research has the "anti-failure" bias, ignoring the value of entrepreneurial failure [3].

McGrath (1999) published a paper that clarifies the important value of entrepreneurial failure from the perspective of real options, refutes the "anti-failure bias", and provides direction guidance for subsequent research on entrepreneurial failure. The research believes that since entrepreneurial failure is an important means of trial and error, entrepreneurs should pay attention to how to minimize the cost of entrepreneurial failure, maximize the value of entrepreneurial failure, and use failure to "approach" success [3].

The core issue of entrepreneurial failure research is "why some entrepreneurs are more active after entrepreneurial failure, while some entrepreneurs are more passive after entrepreneurial failure". Focusing on this core issue, the current research on entrepreneurial failure is mainly carried out from the perspective of psychology and system.

Shepherd (2003) used psychological research on grief to explore the emotion of entrepreneurial failure, clarified the process of entrepreneurs learning from entrepreneurial failure, and proposed a dual grief recovery process aimed at maximizing the learning effect of entrepreneurial failure. The research believes that the loss caused by entrepreneurial failure will cause entrepreneurs to have a sad emotional response, which will interfere with the ability of entrepreneurs to learn from failure. Recovery from grief and learning from entrepreneurial failure is an intertwined process. The time when the grief is completely recovered is the time when failure learning is completed [6].

Lee, Peng and Barney (2007) explored from the perspective of real options how the entrepreneurial friendly bankruptcy law encourages entrepreneurship development at the social level, and also explored the impact of venture capital and stigma on the effectiveness of the bankruptcy law. According to the research, if the bankrupt entrepreneurs are excessively punished for failure, they may give up the opportunities with high risk but high potential income. A more friendly bankruptcy law for entrepreneurs can limit the downside risk of entrepreneurship, thereby indirectly promoting the improvement of the upside income, so as to achieve the purpose of encouraging entrepreneurship development [9].

The current research on entrepreneurial failure has clarified the important value of entrepreneurial failure [3] and explored the formation mechanism of entrepreneurial failure learning [6], but it lacks the understanding of the behavior rules of entrepreneurs after failure. From the perspective of situational learning, the behavioral response of entrepreneurs after entrepreneurial failure is the practical application of knowledge learned from failure, an important part of learning from failure, and an important embodiment of the learning value of entrepreneurial failure.

## 2.2. New Product Development Failure

The failure of new product development project is a kind of specific situation of entrepreneurial failure.

Previous studies have defined NPD project failure in three main categories: one is from project management research, which is defined as a new product development project that does not meet the "Golden Triangle". The "Golden Triangle" is the requirements for new products in terms of launch time, cost and quality. There are preconceived limitations in defining the success or failure of new product development projects by objective criteria such as cost and

quality. The second type of definition comes from corporate entrepreneurship research. Entrepreneurial project is used to describe new product development projects used to develop new technologies or enter new markets. Its failure is defined as the fact that the project resource provider cannot accept the low performance, so the project is terminated. This definition emphasizes the leading role of project resource providers, but even if project resource providers (such as venture capital companies) provide key resources for new product development projects, it is difficult to lead the success or failure of the project, and corporate entrepreneurs as key decision makers are the key to success or failure. The third type of definition also comes from the field of corporate entrepreneurship, which is defined as the termination of new product development projects that are expected to create organizational value but fail to achieve the expected goals.

This study adopts McGrath's point of view, defines the failure of new product development projects as the termination of new product development projects that are expected to create organizational value but fail to achieve the expected goals [3], and emphasizes the leading role of corporate entrepreneurs (hereinafter referred to as "entrepreneurs") in the process of new product development projects.

### 2.3. Entrepreneurial Decision-making

Judgment and decision-making research has a long tradition in the field of management. The decision-making topics related to entrepreneurship can be summarized as opportunity evaluation decision-making, entrepreneurship entry decision-making, development opportunity decision-making, entrepreneurship exit decision-making, inspiration and bias in decision-making, entrepreneurial decision-maker characteristics, entrepreneurial decision-making environment [10]. With the rapid development of entrepreneurial research from the perspective of behavior, the decision-making mechanism and entrepreneurial decision-making research behind entrepreneurial behavior become urgent [11].

Schutjens and Stam (2006) explored potential and realized serial entrepreneurship based on psychology, labor economics and occupational sociology. The research shows that most entrepreneurs maintain the intention of re-establishing after business failure, and almost one quarter of enterprises develop new businesses and carry out continuous entrepreneurship after closure; Although entrepreneurial intention is a necessary condition for the formation of new business, the determinants of re-establishment intention (potential continuous entrepreneurship) and the formation of new business after business closure (realization of continuous entrepreneurship) are different; The urban environment, the number of hours invested in the previous business and the experience of managing the previous business have a positive impact on the intention to re-establish, while the age of entrepreneurs has a negative impact on the intention to re-establish [5].

Hessels and his collaborators (2011) studied the relationship between entrepreneurial exit and subsequent re-employment decision-making, and divided the subsequent participation in the entrepreneurial process into six levels: none, potential, intentional, new, young and established. They found that there was a positive correlation between entrepreneurial exit and re-employment decision-making. The recent entrepreneurial exit reduced the possibility of not undertaking any entrepreneurial activities [12].

Entrepreneurship failure brings financial, emotional and social costs to entrepreneurs, causes various losses, and has a profound impact on entrepreneurs' subsequent entrepreneurial activities, decision-making behavior patterns and preferences.

## 2.4. Event System Theory

The event system theory (Morgeson et al., 2015) integrates the two theoretical paradigms of variation orientation and process orientation, and further improves and develops on this basis [15].

The variance-oriented theoretical paradigm is rooted in Aristotle's philosophy of "metaphysics". It focuses on exploring the connotation of the internal stability characteristics of entities and the correlation between the characteristics, and focuses on turning the characteristics into "variables", and then applies statistical methods to calculate the direction and degree of correlation between variables [15]. However, the philosophical thought of "metaphysics" has defects. It pays too much attention to the connotation and relationship of the internal stability characteristics of entities and ignores the dynamic impact of events on entities [16].

The core idea of the process-oriented theoretical paradigm is that entities exist in the form of processes. The focus of the study of entity processes is the dynamic events experienced by entities rather than the internal stability characteristics of entities [15]. Although the paradigm of process theory focuses on how events affect entities, researchers mostly regard events as dichotomous variables and as a kind of empirical design. They adopt the method of double difference estimation (Difference in Difference, DID; Abadie, 2005), take an event as the research background, compare the numerical changes of a variable before and after the occurrence of the event, and do not quantify the event as a continuous variable into the model, In-depth exploration of the essential attributes of events and how they affect related entities.

The event system theory [8] first defines what an event is. Events are those separate and distinct interactions between multiple entities in the scene. The event system theory emphasizes that events are the external dynamic experience of entities. An event is composed of multiple entities. For any entity in the event, the event has externalities and can be regarded as part of its external environment or situation, which will have an impact on the entity. Events have space-time properties and exist in specific time and space, so events are dynamic.

People can define events with time, space and strength attributes. The event system theory points out that the event intensity attribute (event novelty, disruption, criticality), time attribute (event timing, duration, change and other factors), and space attribute (event origin, horizontal and vertical diffusion range, and the distance between entities and events and other factors) determine the impact of events on relevant entities.

The theoretical model of event system [15] first explains the main effects of event intensity on entities: the greater the intensity of an event (the more novel, subversive and critical), the more it can attract the resources and attention of entities, the more it can mobilize entities, and have an impact on them (such as changing or influencing the behavior and internal characteristics of entities, and stimulating new events). The time and space factors of the event will play a regulatory role in the relationship between the event intensity and the outcome variables, that is, when the event intensity is certain, the more able to meet the entity development needs (event timing), the longer the duration (event duration), the higher level of the enterprise origin (event origin), the larger the scope of divergence (event diffusion), the more able to exert influence on the entities (event distance) close to the event. The intensity, time and space of events constitute a three-dimensional system to explore the internal properties of events.

## 3. Research Hypothesis

In event research, if you want to measure the impact of an event, you should fully consider the three main factors of event intensity, time and space [15].

### 3.1. Event Intensity and Project Management Performance of Entrepreneurs

The new product development project is a trial and error means for the company's entrepreneurs to explore the uncertainty of technology or market. The novelty of the event reflects the degree to which this event is different from the previous events. The more novel and unexpected events are, the easier it is to cause entrepreneurs to process in-depth information about events, thus promoting innovation and change of behaviors, characteristics and events. Based on the perspective of learning, entrepreneurs can learn from failures and show higher initiative and stronger entrepreneurial ability in subsequent entrepreneurial activities. However, failure events with strong novelty may require entrepreneurs to spend more time learning from them, thus improving project management performance. Accordingly, this study proposes:

**H1** The novelty of events has a negative impact on the project management performance of entrepreneurs.

Event disruption refers to the disruption and disruption of the normal activities of entrepreneurs. In order to cope with and adapt to disruptive events, entrepreneurs need to process information at a deeper level, adjust or change existing behavior patterns or characteristics. For entrepreneurs, although they can learn from entrepreneurial failure and improve project management performance, the losses caused by entrepreneurial failure bring great financial, emotional and social costs.

The empirical learning research believes that compared with the successful situation, the failure situation can more motivate individuals to search for new problem solving methods, challenge old ideas and achieve innovation. However, the amount and significance of individual learning from the failure situation may be affected by the source and intensity of failure and other factors. For example, Sitkin believes that failure is accompanied by two kinds of contradictory failure reactions: one is to learn from it and avoid failure again; The second is to find out the reasons and assign responsibilities. Small failures are more likely to encourage entrepreneurs to learn from them rather than impute responsibilities [17]. Therefore, there may be a threshold effect on the disruptive impact of failed events. Before a certain threshold, as the event subversive increases, entrepreneurs "become more and more courageous", learn from it and improve project management performance; However, when the cost of failure is high enough and the disruption reaches a certain threshold, entrepreneurs will "lose out", and their performance in subsequent entrepreneurial activities will become more negative. Accordingly, this study proposes:

**H2** There is an inverted U-shaped relationship between event disruption and project management performance of entrepreneurs.

The criticality of the event reflects the extent to which the event needs to be prioritized by the organization and has a significant impact on the realization of the organization's objectives. The criticality of the event determines the degree of attention that the entity needs to pay to the event and the resources that need to be allocated to deal with the event. The more critical events require the organization to pay more attention and attention to them, the higher the possibility of new behaviors, new features and new events. Key events will enable decision makers to examine the external environment more deeply and assess the impact of the environment on the organization more realistically and objectively to ensure the effectiveness of decision-making. Accordingly, this study proposes:

**H3** The criticality of events has a positive impact on the project management performance of entrepreneurs.

### 3.2. Regulation of Event Space (Event Origin)

Entrepreneurship research focuses on testing the factors of entrepreneurial success or avoidance of failure, but little attention is paid to how entrepreneurs explain entrepreneurial failure and the impact of this interpretation on subsequent entrepreneurial behavior [18].

Relevant research believes that the difference of failure attribution will significantly affect the way entrepreneurs learn from entrepreneurial failure. The external attribution of entrepreneurial failure can either improve the probability of single-loop learning, or has no significant impact on entrepreneurial failure learning; The internal attribution of entrepreneurial failure can improve the probability of double-loop learning, that is, if entrepreneurs attribute entrepreneurial failure to internal factors, whether the internal factors are stable or not, it will promote them to carry out double-loop learning [19].

Single-loop learning is a learning method based on solving an identified problem; Double-loop learning is based on the learning method of introspection for finding the superior solution, which is conducive to finding or accepting a better strategy [20].

The content of double-loop learning is often the key knowledge for entrepreneurs to succeed again in the future. The knowledge gained by double-loop learning enables entrepreneurs to grow and may improve their subsequent entrepreneurial performance [19].

Therefore, this study proposes the following assumptions:

**H4** The origin of events negatively regulates the relationship between event novelty and project management performance of entrepreneurs.

**H5** The origin of events strengthens the positive impact of event disruption on the performance of entrepreneurs' project management, and weakens the negative impact of event disruption on the performance of entrepreneurs' project management.

**H6** The origin of events positively regulates the relationship between the criticality of events and the performance of entrepreneurs' project management.

### 3.3. Theoretical Model

Based on the event system theory, this study deeply explores the impact of the essential attributes of events on the performance of entrepreneurs' project management, and explores the main effect of event intensity (novelty, disruption, and criticality) on the performance of entrepreneurs' project management, as well as the regulatory role of event space (event origin) on the main effect.

Based on the above research assumptions, this study proposes a theoretical model, as shown in Figure 1.

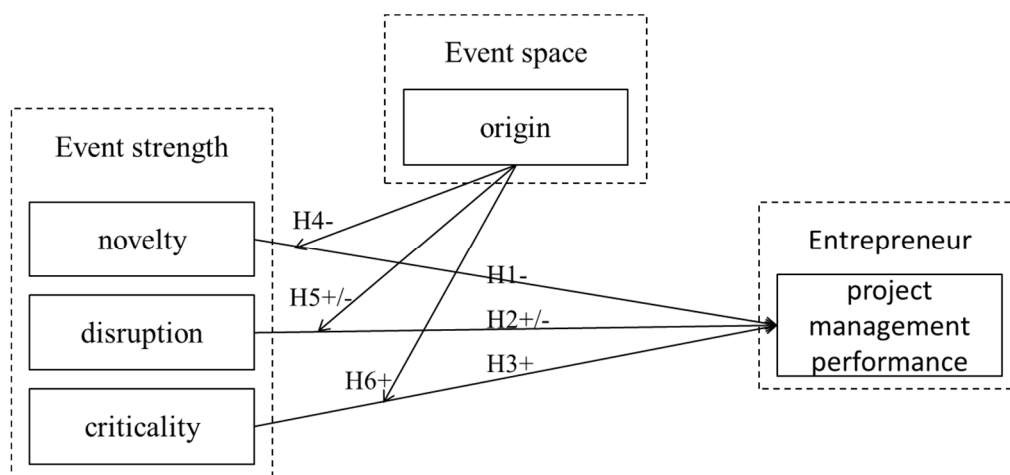


Figure 1. Theoretical model

## 4. Research Design

### 4.1. Data and Samples

As mentioned earlier, new product development is the core activity of entrepreneurial enterprises, and it is very critical; Compared with other entrepreneurial failure scenarios, the failure of new product development projects brings moderate losses and disruption to entrepreneurial enterprises; The project failure scenario carries more information about opportunities and is highly novel. Therefore, this study refers to Shepherd and other relevant studies and selects the new product development project failure as the research scenario.

This study collected research data by means of on-site questionnaire [21]. Before the formal investigation, the original scale was accurately translated by means of back translation, and 20 project leaders who had failed in new product development projects were pre-tested, and the relevant items of the questionnaire were repaired and adjusted according to the feedback of the subjects. This study randomly selected 500 project leaders of new product development teams from different startups in Beijing, Shanghai and Hangzhou, where startups gather, and invited them to evaluate the latest failed new product development project (hereinafter referred to as "Project A"). Before the formal distribution of the questionnaire, the research assistant should make an appointment with the head of the new product development team about the place and time of the interview, and explain the purpose of the research to them before the interview, so as to eliminate their doubts and ensure that there is no deviation in the understanding of the answer. During the research, the research assistant answered the questions of the subjects. After eliminating invalid questionnaires such as no failure experience of new product development projects, 315 valid questionnaires (excluding 20 pre surveys) were recovered from the survey, with an effective recovery rate of 63%. See Table 1 for the distribution of sample characteristics.

**Table 1.** Statistics of sample characteristics

characteristics	classification	sample size	percentage /%
education	below undergraduate	31	9.8
	undergraduate	194	61.6
	master	82	26.0
	doctor	8	2.5
age	≤29	109	34.6
	30-39	171	54.3
	40-49	31	9.8
	≥50	4	1.3
gender	male	219	69.5
	female	96	30.5
total		315	100

According to Table 1, the majority of respondents are men, accounting for 69.5%; The majority of them were 40 years old and below, accounting for 88.9%; In terms of academic qualifications, most of them have bachelor's degree and master's degree, accounting for 61.6% and 26.0% respectively; In general, the samples are widely distributed and representative.

### 4.2. Variables and Measurements

This study includes five variables: novelty, disruption, criticality, project management performance and event origin, and three control variables: education level, personal age and gender. With reference to foreign maturity scales, combined with the research situation and the



feedback of the pre-test, after the item is repaired, the test items are measured using Likert 7-level scale.

Novelty reflects the degree to which events are different from current and past behaviors, characteristics and events; Disruption refers to the disruption and disruption of the regular activities of entities by events; The criticality reflects the extent to which the event needs to be prioritized by the organization and has a significant impact on the realization of the organization's objectives [15]; Project management performance refers to the ability of entrepreneurs to better implement and effectively manage new product development projects after new product development projects fail; The origin of the event refers to the internal nature of the failure reason, that is, the project failure mainly comes from the entrepreneurs themselves, due to their own ability and efforts.

According to relevant research on human capital, education level, personal age and gender and other elements of human capital may have an impact on the performance of entrepreneurs' project management. At the same time, referring to previous relevant research, this study takes the above elements as control variables.

### 4.3. Statistical Analysis Method

This study evaluates the reliability of the scale by testing the internal consistency coefficient, and uses KMO value to evaluate the validity of the scale. Cronbach's  $\alpha$  The coefficient is an important standard for measuring the internal consistency of the scale. The data shows that Cronbach's  $\alpha$  The coefficients are all above 0.7, and the KMO value of the study variable is 0.832, so the reliability and validity of the scale are good.

The results were analyzed by hierarchical linear regression model. The result variable, independent variable and adjustment variable are all continuous variables composed of factor scores, so multiple linear models can be used for regression analysis; In order to distinguish the influence of control variables, independent variables and interaction items, the hierarchical regression model with gradually added variables is adopted for analysis. In order to avoid the possible multicollinearity problem after adding the interaction term, the independent variable and the adjusting variable are standardized, and then the interaction term is calculated and substituted into the model.

## 5. Results

### 5.1. Correlation Analysis

**Table 2.** Descriptive statistics and correlation coefficient matrix

Variables	1	2	3	4	5	6	7	8
education	1							
age	0.180**	1						
gender	-0.101	-0.147**	1					
novelty	-0.016	0.083	0.070	1				
disruption	-0.098	-0.060	-0.017	-0.046	1			
criticality	-0.017	0.029	0.050	-0.166**	-0.106	1		
origin	-0.062	-0.069	-0.049	-0.491**	0.182**	-0.049	1	
management	-0.006	0.159**	-0.026	-0.143*	-0.302**	0.451**	-0.131*	1
mean	2.21	32.81	1.30	3.7117	2.9392	5.3162	3.7090	5.7149
SD	0.645	6.630	0.461	0.81418	1.09141	1.08849	1.17429	0.89834

Note: \* indicates  $p < 0.05$ \*\* Indicates  $p < 0.01$ .

The average value, standard deviation and correlation coefficient of each variable are shown in Table 2. Descriptive statistics and correlation coefficients of all variables were normal, among which, individual age ( $r=0.159, p<0.01$ ), novelty ( $r=-0.143, p<0.05$ ), disruption ( $r=-0.302, p<0.01$ ), criticality ( $r=0.451, p<0.01$ ) and event origin ( $r=-0.131, p<0.05$ ) were significantly correlated with project management performance.

### 5.2. Regression Analysis

This study uses hierarchical regression to test the hypothesis, and the results are shown in Table 3. Model 1 is the regression model of control variables on project management performance, model 2 is the main effect model of control variables and independent variables on project management performance, model 3 and model 4 are the total effect models after adding adjustment variables and interactive effects, and each model shows the test results of data on research assumptions.

**Table 3.** Hierarchical regression analysis results

Variables		Dependent variable: project management performance			
		M1	M2	M3	M4
Control variable	education	-0.036	-0.051	-0.061	-0.074
	age	0.165**	0.159**	0.160**	0.138**
	gender	-0.006	-0.016	-0.016	-0.030
Independent variable	novelty		-0.080	-0.167**	-0.182**
	disruption		-0.303***	-0.287***	-0.307***
	criticality		0.388***	0.363***	0.338***
	Dis square		0.133*	0.164**	0.113↓
Moderator variables	origin			-0.182**	-0.219**
Moderating effect	origin·nov				-0.215***
	origin·dis				-0.030
	origin·cri				-0.129**
	origin·squ				0.082
R square		0.027	0.314	0.337	0.393
Adjusted R square		0.017	0.299	0.320	0.369
F		2.825*	20.091***	19.461***	16.289***

Note: The data in the table are standardized regression coefficients; ↓ indicates  $p < 0.1$  \* Means  $p < 0.05$  \*\* Means  $p < 0.01$  \*\*\* Indicates  $p < 0.001$ .

In Model 3, regression results showed that novelty ( $\beta=-0.167, p<0.01$ ) had a significant negative effect on project management performance, assuming that H1 was supported by the data. The criticality ( $\beta=0.363, p<0.001$ ) was positively correlated with project management performance, assuming that H3 was supported by the data; However, in the regression results, disruption ( $\beta=-0.287, p<0.001$ ) has a significant negative effect on project management performance, and disruption squared ( $\beta=0.164, p<0.01$ ) has a significant positive correlation with project

management performance. The hypothesis of an inverted U-shaped relationship between event disruption and entrepreneurs' project management performance is not valid, but may be a positive U-shaped relationship. H2 is assumed to be unsupported by data.

Model 4 tests the regulatory effect of event origin on the main effect. As shown in Table 3, the event origin has a significant moderating effect on the relationship between novelty and project management performance ( $\beta = -0.215, p < 0.001$ ), assuming that H4 is verified; However, the study did not find that the origin of events has a moderating effect on the relationship between disruption and project management performance ( $\beta = -0.030, p > 0.1$ ), assuming H5 is not supported by data; Model 4 also shows that event origin has a significant moderating effect on the relationship between criticality and project management performance ( $\beta = -0.129, p < 0.01$ ), but this is contrary to the adjustment direction assumed in H6, which has not been empirically tested.

### 5.3. Data Results

To sum up, the regression results show that hypothesis H1, hypothesis H3 and hypothesis H4 are supported by data, that is, event novelty has a negative impact on the performance of entrepreneurs' project management, event criticality has a positive impact on the performance of entrepreneurs' project management, and event origin negatively regulates the relationship between event novelty and the performance of entrepreneurs' project management.

However, hypothesis H2, hypothesis H5 and hypothesis H6 have not been empirically tested. The test result of hypothesis H2 is contrary to the original hypothesis. The regression result shows that event disruption has a significant negative impact on the performance of entrepreneurs' project management, and the square of disruption has a significant positive correlation with the performance of entrepreneurs' project management, indicating that the relationship between event disruption and the performance of entrepreneurs' project management may be a positive U-shaped relationship, not an inverted U-shaped relationship.

This result may be related to subversive measurement items. The subversive nature of events refers to the disruption and interruption of the regular activities of entities by events. The six measuring items on subversive nature in the questionnaire are more about the negative emotions and behaviors of entrepreneurs after experiencing project failure. Although the negative emotions and behaviors of entrepreneurs also reflect the subversive nature of events, they cannot fully reflect the variable definition of subversive nature. From a psychological perspective, the loss caused by the failure of entrepreneurship will make entrepreneurs feel sad, which will interfere with the ability of entrepreneurs to learn from the failure [6], and then affect the project management performance of entrepreneurs in new business.

In addition, the test result of hypothesis H6 is contrary to the adjustment direction in the original hypothesis, and the regression result shows that the event origin negatively regulates the relationship between the event criticality and the entrepreneur's project management performance; At the same time, according to the regression results of model 4, the origin of the event ( $\beta = -0.182, p < 0.01$ ) has a significant negative impact on project management performance.

This result may be related to the double-loop learning process of entrepreneurs. According to relevant research, if the entrepreneurs' internal attribution after the failure of entrepreneurship, it can promote them to carry out double-loop learning and improve the probability of double-loop learning. The content of double-loop learning is often the key knowledge for entrepreneurs to succeed again in the future, so that entrepreneurs can grow [19]. From this point of view, the hypothesis H6 should be established, but the double-loop learning process is a fundamental change or disruption of the assumptions, beliefs and values held by the entrepreneurs before. This process will make the entrepreneurs produce various strong emotions, such as anger, fear, shame, embarrassment and loss. From the emotional point

of view, analyzing failure is a painful process, which may even lead to the reduction of entrepreneurs' sense of self-esteem. Entrepreneurs need time to calm their emotions and recover from grief, and then learn from failure, so as to better implement and effectively manage new product development projects in subsequent decisions. Another cost of double-loop learning is to reduce the level of confidence and optimism. The negative emotions generated by double-loop learning will make it difficult for entrepreneurs to maintain the level of confidence and optimism, thus making entrepreneurs make a more conservative evaluation of their own project management performance.

## 6. Conclusion and Discussion

The leading paradigm of current management research mainly focuses on the "stability characteristics" within the entity, while the impact of relatively dynamic events on the entity is rarely paid attention to. Focusing on the specific situation of "NPD project failure" of entrepreneurial enterprises, this study, based on the event system theory (EST), quantifies the event of new product development failure as a continuous variable and introduces it into the theoretical model, and deeply explores the impact of the essential attributes of events (event intensity and event space) on the performance of entrepreneurial project management and conducts empirical tests. It enriches the application of event system theory and the research of entrepreneurs' behavior results after failure. The results show that event novelty has a negative impact on the project management performance of entrepreneurs, event criticality has a positive impact on the project management performance of entrepreneurs, and event origin negatively regulates the relationship between event novelty and project management performance of entrepreneurs.

(1) This study focuses on the specific situation of "NPD project failure" of start-up enterprises, and defines "NPD project failure" as the termination of the purpose of the company's entrepreneurs for new product development projects that are expected to create organizational value but fail to achieve the expected objectives. The key to defining the concept is the operability of the concept. In this study, the failure of the new product development project is regarded as the subjective perception of the entrepreneurs (decision-makers) responsible for the new product development project that the new product development project has not achieved its expected objectives. Specifically, the criterion for judging whether a project has failed is the subjective judgment of the entrepreneur, not the judgment of the researcher. Only the project decision-maker (entrepreneur) has the right to define whether the project has failed.

The failure of new product development projects is a specific scenario of entrepreneurial failure. This study focuses on three main reasons for the failure of new product development projects: first, new product development is the core activity of entrepreneurial enterprises. For start-ups, the success or failure of new product development is the decisive factor of their competitive advantage, which is very critical; Secondly, compared with other entrepreneurial failure scenarios, the loss of new product development project failure to entrepreneurial enterprises is moderate. Compared with the bankruptcy, liquidation or bankruptcy of enterprises, after the failure of the new product development project, the core resources remain in the organization, which will not bring irreparable losses to the start-up enterprises, and the disruption is moderate; Finally, the failure of new product development projects is a corporate entrepreneurship phenomenon. Compared with other entrepreneurial failure scenarios, project failure is more closely related to the subsequent entrepreneurial activities of entrepreneurs. New product development project is a trial and error means for corporate entrepreneurs to explore technology or market uncertainty. Compared with other failure

scenarios such as financing failure, project failure scenarios carry more information about opportunities and are highly novel.

(2) Based on the event system theory (Morgeson et al., 2015), this study quantifies new product development failure events into continuous variables and introduces them into the theoretical model to explore the impact of the essential attributes of events (event intensity and event space) on the performance of entrepreneurs' project management and conduct empirical tests. At present, management theory and research mainly focus on the internal stability characteristics of the entity, and pay attention to the connotation and relationship of the internal characteristics of the entity, but few studies start from the event itself to explore the impact process of the event attributes on the entity. However, the dynamic events experienced by entities are also significantly affecting and changing entities. In fact, events in situations have been considered as a new research perspective that is different from the internal characteristics of entities (such as individuals, teams and organizations) (Dinh et al., 2014; Johns, 20172018). The event system theory integrates the two theoretical paradigms of variation orientation and process orientation, and further improves and develops on this basis. On the one hand, the event system theory, combined with the paradigm of variation oriented theory, advocates in-depth study of the attributes of events (event intensity, time and space attributes); On the other hand, it provides a theoretical integration framework composed of event attributes. As an extension of the paradigm of variation orientation and process orientation, the event system theory explains how entities change under the joint action of event intensity, time and space: change or form new entity behaviors, characteristics or stimulate subsequent events.

(3) This study uses the hierarchical linear regression model to analyze the results. The result variable, independent variable and adjustment variable are all continuous variables composed of factor scores, so multiple linear models can be used for regression analysis; In order to distinguish the influence of control variables, independent variables and interaction items, the hierarchical regression model with gradually added variables is adopted for analysis. In order to avoid the possible multicollinearity problem after adding the interaction term, the independent variable and the adjusting variable are standardized, and then the interaction term is calculated and substituted into the model.

Relevant statistical analysis showed that there was significant correlation between individual age ( $r=0.159$ ,  $p<0.01$ ), novelty ( $r=-0.143$ ,  $p<0.05$ ), disruption ( $r=-0.302$ ,  $p<0.01$ ), criticality ( $r=0.451$ ,  $p<0.01$ ) and event origin ( $r=-0.131$ ,  $p<0.05$ ) and project management performance. Hierarchical regression results show that hypothesis H1, hypothesis H3 and hypothesis H4 are supported by data, that is, event novelty has a negative impact on entrepreneurs' project management performance, event criticality has a positive impact on entrepreneurs' project management performance, and event origin negatively regulates the relationship between event novelty and entrepreneurs' project management performance.

(4) New product development project is a trial and error means for entrepreneurs to explore technology or market uncertainty. The empirical results of this study show that event novelty has a negative impact on the performance of entrepreneurs' project management. The novelty of the event reflects the degree to which the event is different from the present and past behaviors, characteristics and events. Based on the learning perspective, entrepreneurs can learn from the failure and show higher initiative and stronger entrepreneurial ability in the subsequent entrepreneurial activities. However, a failure event with strong novelty may require entrepreneurs to spend more time learning from it, thus improving project management performance.

The criticality of the event reflects the extent to which the event needs to be prioritized by the organization and has a significant impact on the realization of the organization's objectives. The criticality of the event determines the degree of attention that the entity needs to pay to the

event and the resources that need to be allocated to deal with the event. Key events will enable decision makers to examine the external environment more deeply and assess the impact of the environment on the organization more realistically and objectively to ensure the effectiveness of decision-making. Therefore, event criticality has a positive impact on the performance of entrepreneurs' project management.

The regression results show that the origin of events negatively regulates the relationship between the novelty of events and the performance of entrepreneurs' project management. The origin of the event refers to the internal nature of the failure reason, that is, the project failure is mainly attributed to the entrepreneur's own ability and effort. According to relevant research, if the entrepreneurs' internal attribution after the failure of entrepreneurship, it can promote them to carry out double-loop learning and improve the probability of double-loop learning. The content of double-loop learning is often the key knowledge for entrepreneurs to succeed again in the future, so that entrepreneurs can grow.

(5) According to empirical learning research, suppose H2 believes that for entrepreneurs, there may be a threshold effect on the subversive impact of failure events. Before a certain threshold, as the event subversive increases, entrepreneurs "become more frustrated and more courageous". After the subversive reaches a certain threshold, entrepreneurs "continue to fail". However, the regression result of the model is contrary to the original hypothesis. Event disruption has a significant negative impact on the performance of entrepreneurs' project management, and the square of disruption has a significant positive correlation with the performance of entrepreneurs' project management. This result may be due to the fact that the subversive measurement items focus more on the negative emotions and behaviors of entrepreneurs after project failure, and fail to fully reflect the definition of subversive variables. From a psychological perspective, the loss caused by the failure of entrepreneurship will make entrepreneurs feel sad, which will interfere with the ability of entrepreneurs to learn from the failure, and then affect the project management performance of entrepreneurs in new business. Suppose H6 believes that the origin of events positively regulates the relationship between the criticality of events and the performance of entrepreneurs' project management. However, the test result is contrary to the adjustment direction in the original hypothesis, which may be related to the entrepreneurs' double-loop learning process. The double-loop learning process is a fundamental change or disruption of the assumptions, beliefs and values previously held by entrepreneurs. This process will cause entrepreneurs to generate various strong emotions. From the emotional point of view, entrepreneurs need time to calm their emotions and recover from grief, then learn from failure and improve project management performance; In addition, the negative emotions generated by double-loop learning will make it difficult for entrepreneurs to maintain confidence and optimism, thus making entrepreneurs make a conservative evaluation of their own project management performance.

(6) This study has three limitations. First, the measurement of variables is not accurate enough to measure the characteristics of events well. For example, the measurement of event disruption focuses more on the negative emotions and behaviors of entrepreneurs after project failure. Although the negative emotions and behaviors of entrepreneurs also reflect the event disruption, they cannot fully reflect the variable definition of disruption, thus affecting the empirical test. Future research can use the maturity scale in Morgeson's series of articles on events to measure the novelty, disruption and criticality of events, so as to measure the characteristics of events more accurately.

Secondly, only the intensity and spatial attributes of the event are considered. The event system theory proposes that researchers can quantify events according to their characteristics (intensity, time and space factors). In event research, if you want to measure the impact of an event, you should fully consider the three main factors of event intensity, time and space. In the

future, we can investigate the main effects of event attributes (intensity, time, space) and their interaction or modulation effects with the internal characteristics of entities.

Finally, the selection of result variables is relatively simple. Entrepreneurship failure brings financial, emotional and social costs to entrepreneurs, causes various losses, and has a profound impact on entrepreneurs' subsequent entrepreneurial activities, decision-making behavior patterns and preferences. In order to overcome all kinds of losses caused by entrepreneurial failure, entrepreneurs may have many behavioral patterns, such as regrouping, putting an end to the situation, striving for governance, and being patient. Their decisions and behaviors may also show some characteristics and preferences, such as the subsequent entrepreneurial rate, industrial entry decisions, and governance decisions. Future research needs to pay more attention to the behavior of entrepreneurs after failure.

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