

# The Impact of Reward and Project Characteristics on Product Development Team's Speed to Market

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## Abstract

New product development has become an important issue during the past decades. Although product development teams are the main sources of innovation, the antecedents of product development teams' performance are still unclear. Moreover, previous research related to the impacts of different reward designs has not reached a consistence thus far. In this study, the authors use various reward and teams' project characteristics to be the research objects and test their relationships with product development team's speed to market. Questionnaire data are collected on product development teams from Taiwan's high-tech industry. Also, regression analyses are used for the tests of alignment hypotheses. Their findings support that position-based rewards and procedure justice are positively related to team's speed to market. Project risk and the length of project development cycle both are negatively related to team's speed to market. And the most notable finding is that offering employees more shares than cash results in a decrease in team's speed to market. This research can offer important management and practical implications for both reward structure designs and new product development team management.

**Keywords:** Reward Characteristics, Project Characteristics, Product Development Team's Speed to Market.

# 獎酬及計畫特性對新產品發展團隊 上市速度之影響

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## 摘要

新產品發展在近年來日益受到重視，雖然新產品發展團隊是創新的主要來源，影響新產品發展團隊績效的因素卻仍然未臻明朗，不同的獎酬設計如何影響產品發展亦未達共識。本文探討不同的獎酬及計畫特性對於新產品發展團隊上市速度的影響。資料取自台灣高科技研發團隊，並且利用回歸分析進行假說檢定。研究發現職級基礎的獎酬與新產品發展團隊的上市速度有正面關聯，計畫風險及研發計畫循環時間則對之有負面影響；而最引人注意的發現是當給予員工較高比例的股票獎酬，反而導致上市速度下降。本研究結果將可對於獎酬設計及新產品發展團隊的管理提供重要的管理及實務意涵。

**關鍵詞：**獎酬特性、計畫特性、產品發展團隊上市速度。

## 1. Introduction

Factors that determine new product development success have become an important concern in many industries because in a highly competitive environment firms cannot sustain their advantages just relying on current products. The rapid changes in technology, customer preferences, and global competition all force firms to innovate continuously and effectively. Since most creations come from product development teams, the issues about how to encourage team members to create and which kinds of projects characteristics tend to make teams succeed have become more important. Motivation theory indicates that human behaviors are directed by their motives; some related researches also focus on the relationships among motives, rewards and payoffs (Steers, Mowday and Shapiro, 2004). Even in human resource management research and practice, the importance of reward structures is still stressed, especially in creative organizations (Paauwe and Boselie, 2005 ; Lau and Ngo, 2004 ; Mumford , 2000). Superior reward designs not only integrate firms' and employees' goals alignment but also lead to employees' contributions toward firm's desired goals.

Practical research also indicates that each project has different odds to succeed in marketplace. It would be interesting to discuss the important project characteristics that would be relevant to team success. Given that reward structures can be applied in various fields, this paper only focuses on product development teams. Because product development team members face with more challenges, risks and pressures than others, the role of reward system would be even more important and worth addressing. In creative organizations, incentive systems will have critical impact on team performance (Chiu, 2003; Davila, 2003; Menon, Chowdhury and Lukas, 2002); furthermore, due to various departments involving in the product development process, reward designs should be helpful to reconcile conflicts and disputes among members (Bonner, Ruekert and Walker, 2002), and they also should be able to increase the integration of R&D and marketing departments (Griffin and Hauser, 1996). Once a firm chooses an inappropriate reward designs, it will seriously damage a firm's performance.

Notably, on account of the specific corporation, taxation and GAAP regulations in Taiwan, various combinations of reward

structures are employed in high-tech industry. This great diversity can be regarded as a critical factor for this industry to succeed and attract creative people. But this point of view also meets lots of challenges. Different perspectives about the effects of Taiwanese profit sharing plans still reflect a lack of consensus. Associated with this phenomenon, the focus of the article will be on various kinds of structure characteristics, instead of focusing on the impact of a limited of factors (Davila, 2003 ; Bonner, Ruekert and Walker, 2002 ; Gamble, 2000; Beatty, 1995). In addition, the authors do not consider other incentive systems, such as promotion, compensation plan, and salary rise, in order to concentrate their research attentions on several specific issues.

Additionally, to investigate the antecedents of new product success, the characteristics of projects will not be ignored. Researchers have put thier emphasis on different attributes of projects and try to identify their relationships with product development success (Nihtilä, 1999 ; Insead , 2000; McDonough III , 2000; Swink, 1999). In the research, the authors investigate several properties of projects such as project risk and the length of

development cycle and try to examine their impact on product development success. By understanding what causes projects to succeed more, it is helpful for finding ways to enhance teams' rate of success.

To sum up, this study has several purposes. One is to explore the impact of reward characteristics on product development team performance. Toward this end, this paper attempts to explain the roles of distinct reward characteristics in high-tech industry as well as the contribution they make to product development teams. Another is to investigate the impact of project characteristics on team performance. Finally, the authors take an interesting issue into consideration and investigate if firms offer employees more shares than cash, what impact will it make on team performance?

In other words, the research questions of this paper are as follows. Do different reward characteristics significantly influence product development team performance in Taiwan's high-tech context? Do project characteristics play important roles in team performance? Furthermore, if organizations pay more shares than cash, what would team performance be? In the following sections, the authors first briefly

review the related research and establish their conceptual framework and relevant hypotheses. Next, the authors describe their research method and data collection procedure. Third, the regression results will be explained and discussed. Finally, research and managerial implications and suggestions for future research are offered at the last section of the paper.

## 2. Literature review

### 2.1 Conceptual framework

In order to identify the relationships among reward characteristics, project characteristics and team performance, the authors propose a conceptual framework to describe their linkages (see figure 1). The

framework has some properties worth noting. First, it depicts the relationships among the distribution type of rewards (position and equal-based rewards), the timing of rewarding (outcome and process-based rewards), and team performance. Second, the authors extend previous studies and discuss the impact of payment types (share and cash-based rewards,) and other reward characteristics (procedure justice) on team performance. Third, the authors attempt to analyze the roles of project characteristics (project risk and the length of development cycle) in team performance. In the following section, the relevant hypotheses are derived after reviewing relevant literature and studies.

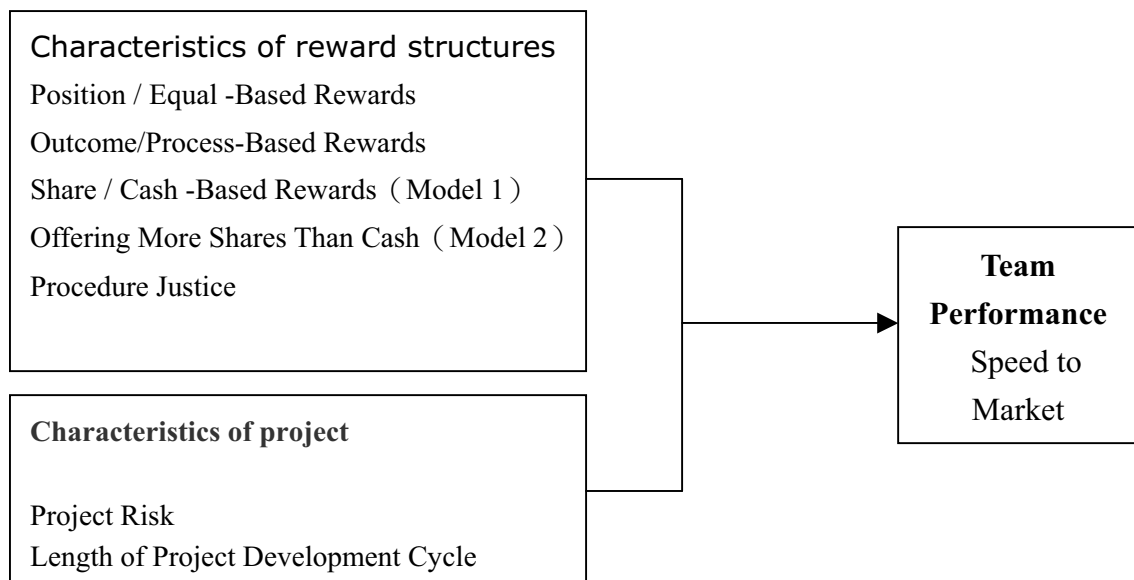


Figure 1 Conceptual framework

## 2.2 Reward and project Characteristics

Motivation theory is often used to explain the inner driver which forces employees to work hard to enhance firms' performances (Cordero, Walsh and Kirchhoff, 2005). In some studies, expectancy theory even serves a good reason to explain why people work harder when they feel they can get valuable payoff (Cordero, Walsh and Kirchhoff, 2005). Previous studies have shown that there are reasonable linkages between financial incentives and people's behaviors. In applying these theories, adequate incentive systems and organization mechanisms are designed in human resource management practices to ensure employees achieving firm's expected goals. That is to say; reward structures play significant roles in individual's performance (Brazeal, 1996), and are also helpful to increase firms' JIT performance (Fullerton and McWatters, 2002). Rewards are the most popular devices used by firms to attract and motivate employees, and this phenomenon makes them an issue of concern.

Mumford (2000) focused on the management of creative people and indicated that the essential elements of

reward structures, such as evaluation types and the linkages between goal and performance, will significantly impact on the creation performance. Evidence also shows that reward designs play critical roles in new product development process; it means a well-designed reward structure will not only motivate employees to contribute their efforts to create (Lau and Ngo, 2004), but also enhance new product development performance (Davila, 2003 ; Sethi, Smith and Park, 2001). Most important of all, members in product development teams need effective reward systems to promote themselves to integrate with others and thus increase their team performance.

What are the critical characteristics that have great impacts on innovation performance? Research on this field has dealt with several different reward structures. After interviewing high-tech employees, Sarin and Mahajan (2001) indicated that the timing of payment and the distribution of rewards among employees both are possible elements which respondents are concerned about. In another paper, Sarin and Mahajan (2001) found that in the integration process of marketing, manufacturing and R&D departments, evaluation criteria and management

expectation both play important roles on the cooperation outcome and new product development performance. Kuvaas (2003) further proposed that different types of payment, such as employees' preferences for cash or shares, could impact on their performance. All these studies point out the characteristics of reward designs that need to be addressed. Additionally, the authors discuss the impact of the extent to which a firm uses more shares over cash in order to verify if firms change the weight of payments types, what impacts will it make?

In addition to the growing significance of reward structures, researchers also put their emphasis on different attributes of projects and try to identify their relationships with performance. Nihtilä (1999) revealed the linkage between integration mechanisms and product development success. Insead's (2000) study further summarized several researchers' work on how market and new product development process characteristics are related to new product success. McDonough III (2000) and Swink (1999) paid attention on some project characteristics, such as project complexity and project goal, to discuss their impact on performance. To illustrate the influence of project

characteristics, this research considers two kinds of project properties and explores their causal relationship with team performance.

### 2.3 Position-based and Equal-based rewards

In investigating high-tech industry, Sarin and Mahajan (2001) divided the rewards distributed among team members into two separated types: position and equal-based rewards. They further defined position-based rewards as the degree to which rewards are distributed among team members on the basis of their position or status in the organization. And equal rewards are defined as the degree to which rewards are distributed equally among team members.

As to the impacts of these two reward structures, previous research has often been conflicting points. One point of view in the field of innovation management is that reward structures should be designed in terms of individual performance to bring useful motivation (Lau and Ngo, 2004). Obviously, rewards should significantly relate to individual performance in order to motivate people to accomplish the desired goals (Ramaswami and Singh, 2003). In Feldman's (1996) work from a 1994 PDMA

membership survey, it can be seen that people with higher positions in organizations will get more incentives because they control more resources, take more responsibility, and deal with more risky and difficult events. All these offer good reasons for firms to use position-based rewards to motivate people.

In terms of equal basis, members in a team will be treated equally and thus the competition between each other will be decreased. In the new product development process, it is quite important to motivate members to integrate, cooperate, and share information with each other (Griffin and Hauser, 1996 ; Song, Montoya-Weiss and Schmidt, 1997). Reward designs should not arouse members' conflict and opposition. When teams work as a whole, they can achieve better performance. In this perspective, equal-based rewards will be helpful to encourage teamwork.

After an empirical investigation, Sarin and Mahajan (2001) showed that position-based reward structures are positive to team members' satisfaction, but on the contrary, equal-based reward structures will have negative influence on team members' satisfaction. This result also showed that reward structures should be designed to

differentiate each other's contribution and effort. Position-based reward structures take employees' position, responsibility, and risk into account, so they should be helpful to evaluate one's overall effort. But on the other hand, equal-based reward structures regard every one as equal and ignore individual differences. In most cases, it may harm one's expectation and contributions. Thus: H1. The use of position-based reward is positively associated with team performance.

H2. The use of equal-based reward is negatively associated with team performance.

## 2.4 Outcome-based and process-based rewards

Most often, reward structures cannot be separated from control system and evaluation structures because they are connected with each other and related to organizational performance. Some researchers (Bonner, Ruekert and Walker, 2002) regarded process control and outcome control as two ways of formal control. Sometimes rewards can be offered just behind control activities in order to encourage or correct employee's behavior, and that will be the basis of process and outcome rewards. Although



outcome/process control, and outcome/process-based rewards are all components of formal control (Bonner, 2005), the first two emphasize how to monitor and take corrective actions and the last two are tied to the timing of offering rewards. According to some studies (Atuahene-Gima and Murray, 2004; Sarin and Mahajan, 2001), process-based and outcome-based rewards mean separated timing of giving payment. They also defined process-based rewards as the degree to which team rewards are depending on relevant procedures, behaviors or ways of reaching desired outcomes. Outcome-based rewards are defined as the degree to which team rewards are on the basis of bottom-line profitability of the project.

Product development activities are risky and easily fail, so reward payments should be offered at the right time to encourage employees to move forward. Outcome-based rewards focus on some specific outcome achieved, such as profitability or market share (Sarin and Mahajan, 2001); and this would make employees under more pressures and uncertainties. This also means employees cannot get rewards until they really achieve some expected outcomes.

On the other hand, process-based rewards tie closely to specific activities, procedure or behavior (Sarin and Mahajan, 2001); monitoring activities would be taken during the whole product development process. Once employees achieve specific procedural milestones, they can get rewards. So employees can keep motivated during the whole development process. This kind of reward design will force employees to concentrate on activities and behaviors that meet the teams' expected milestones.

However, there appears to be several opposing views in the literature concerning the impact of outcome-based and process-based rewards on product development success. Song and Montoya-Weis (1998) revealed that no matter what kind of product innovation firms are working on, the critical activities and procedures would significantly influence new product success. The same results can be found in other studies (Rochford and Rudelius, 1997 ; Cooper and Kleinschmidt, 1986; Tzokas, Hultink and Hart, 2004). Furthermore, the adequacy of evaluation criteria during development process still plays a particularly critical role in success. Further supports were offered by Atuahene-Gima and Murray (2004) who

suggested that process rewards were positively related to marketing strategy comprehensiveness. All of these studies suggest that process-based rewards would bring better performance.

Still other research suggests that process control is negative to project performance because over-specification of procedures may limit teams' ability and flexibility (Bonner, Ruekert and Walker Jr., 2002). Similarly, Bonner's (2005) findings indicated that outcome control is positively related to customer interaction. Both studies hold different points of view on outcome/process control.

Even so, because outcome-based reward structures take the outcome as the employees' first job and people know that they cannot get any rewards unless they achieve their objectives, there should be reasonable relationship between outcome-based reward structures and team performance. But putting too much attention on the process control could get lost in the details and ignore the exact goals. Thus;

H3. The use of outcome-based rewards is positively associated with team performance.

H4. The use of process-based rewards is negatively associated with team performance.

## 2.5 Share-based and cash-based rewards

There are various payment types employed in Taiwanese business. In high-tech industry, the phenomenon becomes especially more obvious. Distinct combinations of reward structures, such as bonus, profit sharing with cash, profit sharing with shares, and employee stock ownership plan (ESOP) are all commonly used. Despite different effects in accounting and taxation, these payments can be classified into two broad categories: cash-based and share-based incentives. The former includes bonus, profit sharing with cash plans, and the latter is composed of profit sharing with shares, and ESOP.

As can be seen, cash and share-based rewards are both important financial mechanisms but different from forms of payment. Cash-based rewards are made with cash, so the present value of rewards is equivalent to the amount offered without any risk. Evidence shows that in highly competitive environments, the proportion of firms using cash as rewards is increasing. Similar support is offered by Joseph and Kalwani (1998) who found bonuses are not only a commonly used device to motivate salesmen, but also an effective instrument to

induce higher performance and goal consistency. Research on new product performance by Feldman (1996) reached the same conclusion. It appears that in most cases financial incentives like cash will motivate people to devote their best effort and encourage creation.

An alternative way of payment is share-based incentives. Associated with the specific taxation and GAAP regulations in Taiwan, share-based schemes differ from those used in western countries. The most commonly form used in Taiwan is a profit sharing with shares plan. It is a program between profit sharing and employee stock ownership plans, so employees can exercise their ownership over firms and at the same time get the benefit from profit sharing . Profit sharing schemes are proved to be a good way to enhance performance (Chowdhury and Hoque, 1998; Juin-jen, Lai and Lin, 2003). Ohkusa and Ohtake (1997) provided evidence in support of ESOP and information sharing may enhance employees' long-term commitments. Moreover, share-based rewards have caught lots of attention because the ownership sense of employees is considered as one way to decrease the conflicts between managers and shareholders, and to give

chances for employees to participate in decision-making and enjoy the advantages of stock price increases. Ding and Sun's work (2001) further gave more evidence to support the positive relationships between ESOP, the managerial and shareholders' interest alignment, and firm performance. Maudlin (1999) verified the positive relationship between ESOP and employees' performance. Beatty (1995) found the use of ESOP is positively related to the increase of productivity. As the preceding discussion shows, it is reasonable to expect that cash-based and share-based rewards are both important and effective incentive programs. So they should be positively related to team performance. Employees would feel motivated and recognized by receiving each of them. Thus: H5. The use of share-based rewards is positively associated with team performance.

H6. The use of cash-based rewards is positively associated with team performance.

Most dramatically, an important stream of studies has emerged to argue the advantages of share-based rewards. One author indicated that this sense of ownership on the basis of monetary benefits alone cannot stand long (Chiu, 2003), especially

during a rough time of financial or operating difficulties. Another author further pointed out that owning firm's shares would increase employee's risk due to lack of investment diversification (Maudlin, 1999). Gamble's work (2000) indicated that because it is not easy for employees to organize a vote against managers or to replace an inadequate top-level manager, some ESOPs may not be effective mechanisms to achieve alignment. He even considered that as the ESOP stock concentration increases, managers would become more risk-averse and reduce their commitments to innovate. If these viewpoints are true, they would be a great warning to those high-tech firms which usually offer employees more shares than cash. Especially, if employees always care more about short-term financial incentives than the sense of ownership, then the more shares they get, the more they want to sell. Otherwise, taking too much risk in new product development might damage employees' financial benefits, especially when most of employees are risk-averse. Thus;

H7. Offering employees more shares than cash is negatively associated with team performance.

## 2.6 Procedure justice

Commonly, employees care about not only what time, what amount and what types of payment they can receive, but also the perceptions of reward systems that are used to determine their rewards. Only when employees are convinced that related systems are fair, they will make their commitments. Thus far, there are several forms of justice, but two of them have received much research attention: distribution justice and procedure justice (Scandura, 1997 ; Floger and Konovsky, 1989). The former is defined as an employee's fairness perception of the ratio between rewards and effort on the job. In other words, it means the employees' subjective perception of the fairness of compensation they get. And the latter is related to the fair rules used to decide resource allocation. In recent years, more attempts have begun to focus on employees' perceptions of procedure justice. Lau and Lim (2002) once verified its impact on members' performance alone and revealed its importance. Since this article puts much attention on the substantial reward employees finally get, the authors take procedure justice into consideration to extend their discussion.

The fairness perceptions of procedure are proved to have significant impact on employees' attitudes and behaviors (Polyhart and Ryan, 1997; Lau and Lim, 2002). Evidence shows that when members feel everyone is equally important and treated fairly, they will share and exchange information with each other (Song, Neeley and Zhao, 1996) and increase their willingness to cooperate (Kuvaas, 2003). The perception of fairness plays a critical role in organization operations. Therefore, an effective reward design should first make employees feel they are treated equally without discrimination. Then they would trust the system and be willing to provide their efforts, especially when various professionals are involved in the process of product development, and there comes a need for integration, information dissemination and sharing. If employees do not feel the system is fair to everyone, they will quit their job, reduce their commitments to firms, and take inadequate actions in return (Parker and Kohlmeyer III, 2005). So increasing the degree of employees' perception of procedure justice will enhance team performance. Thus;

H8. The degree of employees' perception of procedure justice is positively associated with team performance.

## 2.7 Project characteristics

To discuss the antecedents of team performance, some researchers have paid their attention on various project characteristics. For example, McDonough III (2000) focused on the effect of project goals on team behaviors. Swink's study (1999) of investigating new product development project indicated that project complexity is associated with poor new product manufacturability. This means when the degree of project complexity increases, the difficulties in coordination, integration and communication will also increase. He also suggested that greater technology uncertainty in new product development is negatively related to manufacturability because of lack of related experiences. It appears that various project characteristics would significantly influence the success of product development.

Since more risky projects means firms invest more resources there, they will bring project development teams more uncertainties, complexities and difficulties. Besides, risky projects easily fail because they involve unknown areas in knowledge, technology and competitive types. As a consequence, the risk of projects will become one of the critical factors that affect

team performance.

On the other hand, in high-tech industry, the length of the development cycle should be more important because it affects the uncertainty of technology and knowledge. The authors argue that when the length of the development cycle becomes longer, employees will become tired easily and lose their attention, interests and energies. So the projects characteristics mentioned above will be negatively related to their final outcome. Thus;

H9. The degree of project risk is negatively associated with team performance.

H10. The length of the project development cycle is negatively associated with team performance.

### 3. Method

#### 3.1 Sample and data collection

In this study, the authors employed questionnaires developed by previous studies and then modified them in order to fit the environment of Taiwan's high-tech industry and their research objectives and hypotheses. Because the level of analysis was a product development team, a sample of product development team members

employed by Taiwan's high-tech organizations was investigated. Convenience sampling was undertaken as a fast and easy way to collect data. A two-wave E-mailing method, plus an e-mail reminder, was used to collect data. Finally, a total of 420 questionnaire surveys were initially e-mailed. In detail, the authors collected 74 questionnaires, which represented a 17.6% return rate.

#### 3.2 Measures

This study used "speed to market" to assess product development performance. The authors thought this variable was especially important because it influenced firms' competition advantages in high-tech industry. Furthermore, using this variable could get rid of the effect of some external factors as possible. Team members could rate their performance by comparing team's actual performance to expected outcome by using a single item, five-point Likert-type scale instrument ( 1= "well below expectations," and 5= "well above expectations" ). As previous mentioned, if available, existing measures were adapted for this research. For constructs that did not have existing scale, measurement scales were then developed by the authors using

their conceptual definitions. In this study, the authors measured all constructs on five-point Likert scales (1 signifying total disagreement, and 5 signifying complete agreement) except the length of project development cycle. Position and equal-based rewards measure scales came from Sarin and Mahajan (2001). The first construct was measured by using a two-item scale instrument that captured the extent to which employees' rewards were based on their salaries and positions. The second construct was measured by using a four-item scale instrument that captured the extent to which employees' rewards were based on their contributions or were rewarded equally. The authors drew items from Sarin and Mahajan's work (2001) to measure outcome and process-based rewards. The first construct was measured by using a two-item scale instrument that captured the extent to which employees' rewards were based on their profit contribution to the team and the extent to which employees' rewards were deferred until bottom-line results of the team were available. The second construct was measured by using a three-item scale instrument that captured the extent to which employees' rewards were received after completing major milestones and certain

prescribed conditions and the extent to which teamwork behavior was taken into account during evaluating the team. The authors developed two three-item scale instruments to measure cash and share-based rewards by asking respondents the degree to which their rewards were paid by cash or shares. Offering more shares than cash was measured using a single item scale instrument by asking respondents the extent to which their rewards were composed of either cash or shares (1= "cash far over shares," and 5= "shares far over cash").

Measurement scales developed by Lau and Lim (2002) were modified to form the items of procedure justice. Informants were requested to indicate the fairness of the procedures that were used to evaluate their performance, communicate their performance feedback and determine their rewards. They were measured using a three-item scale instrument.

Sarin and Mahajan's (2001) instruments were also useful for the measurement of project risk and the length of project development cycle. Project risk was measured using a four-item scale instrument that captured the degree to which employees perceived their development project's importance, strategic value and

investments. The other variable, the length of project development cycle, was measured using a single item to capture the time span which team project usually took (in months).

### 3.3 Reliability and validity testing of the measures

First, the authors conducted the reliability analysis by way of Cronbach's alpha coefficient to measure the internal consistency reliability of the constructs. Alpha reliabilities of these scales range from

0.56 and 0.94, demonstrating acceptable consistency. Therefore, the measures of this research are considered reliable. Using the principle components method, factor analysis revealed ten distinct factors with eigen-values greater than 1.0, which accounted for 73% of total variance in the data. Table 1 displays the descriptive statistics and reliability indices for all the constructs.

**Table1**  
**Measures descriptive and reliability statistics**

Measures	Items	Means	Coefficient $\alpha$
Position-Based Rewards	2	3.22	0.57
Equal-Based Rewards	4	2.42	0.76
Outcome-Based Rewards	2	3.49	0.56
Process-Based Rewards	3	3.61	0.76
Share-Based Rewards	3	3.27	0.87
Cash-Based Rewards	3	4.00	0.81
Offer More Shares Than Cash	1	2.92	-
Procedure Justice	3	3.01	0.94
Project Risk	4	3.67	0.69
The Length of Project Development Cycle	1	10.12	-
Speed to market	1	2.46	-



## 4. Results

### 4.1 Model specification and estimations

In this study, the authors performed separated regression analyses for each model to analyze their hypotheses. Model 1 consists of nine explanatory variables including position and equal-based rewards, outcome and process-based rewards, share

and cash-based rewards, procedure justice, project risk and the length of project development cycle. Model 2 drops two explanatory variables, share and cash-based rewards, and adds a new variable, offering more shares than cash, instead. Two models are used to evaluate the effect of reward and project characteristics on team performance and presented as follows.

$$(1) \text{ Team performance} = \beta_0 + \beta_1(\text{POS}) + \beta_2(\text{EQU}) + \beta_3(\text{OUT}) + \beta_4(\text{PRO}) + \beta_5(\text{SHA}) + \beta_6(\text{CAS}) + \beta_7(\text{JUS}) + \beta_8(\text{RIS}) + \beta_9(\text{CYC}) + \varepsilon \dots\dots\dots \text{Model 1}$$

$$(2) \text{ Team performance} = \beta_0 + \beta_1(\text{POS}) + \beta_2(\text{EQU}) + \beta_3(\text{OUT}) + \beta_4(\text{PRO}) + \beta_5(\text{OFFSHA}) + \beta_6(\text{JUS}) + \beta_7(\text{RIS}) + \beta_8(\text{CYC}) + \varepsilon \dots\dots\dots \text{Model 2}$$

where

- POS= position-based rewards
- EQU= equal-based rewards
- OUT= outcome-based rewards
- PRO= process-based rewards
- SHA= share-based rewards
- CAS= cash-based rewards
- OFFSHA= offering more shares than cash
- JUS= procedure justice
- RIS= project risk
- CYC= the length of project development cycle

Table 2 presents correlations for the variables investigated in the study. As can be seen, position-based rewards, process-based rewards, cash-based rewards and procedure justice are positively

correlated to speed to market. And offering more shares than cash, project risk and the length of project development cycle are negatively correlated to speed to market.

**Table 2**  
**Pearson correlations among the variables ( N=74)**

	POS	EQU	OUT	PRO	SHA	CAS	OFFSHA	JUS	RIS	CYC
POS	1									
EQU	-0.07	1								
OUT	-0.01	-0.22	1							
PRO	0.27*	-0.45**	0.34**	1						
SHA	0.11	-0.28*	0.14	0.38**	1					
CAS	0.15	-0.37**	0.23*	0.41**	0.52**	1				
OFFSHA	0.01	0.04	0.09	0.28*	0.20	0.10	1			
JUS	0.01	-0.38**	0.28*	0.23**	0.04	0.19	0.30**	1		
RIS	0.22	-0.45**	0.21	0.40*	0.28*	0.30*	0.13	0.23*	1	
CYC	0.03	-0.01	0.21	0.15	0.01	0.17	-0.10	.08**	0.13	1
Speed to market	0.22**	-0.15	0.10	0.17*	0.08	0.12*	-0.12*	0.37**	-0.20*	-0.25*

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

The variance inflation factors in the regression models were all less than 2, which indicates that multicollinearity is not a serious problem. Table 3 contains the results of the tests.

As expected, H1 hypothesizes that the use of position-based reward is positively associated with team performance. The findings support H1 ( $\beta=0.229$ ,  $p<0.05$ ). H2, which predicts the use of equal-based reward is negatively associated with team performance is not supported. H3, which predicts the use of outcome-based reward structures is positively associated with team performance, is not supported. H4, which predicts the use of process-based rewards is negatively associated with team

performance, is not supported, either. However, no support was found for H5 and H6, which hypothesize that the use of share and cash-based rewards is positively associated with team performance. H8 ( $\beta=0.344$ ,  $p<0.01$ ), which hypothesizes that the degree of employees' perception of procedure justice is positively associated with team performance, is supported. As hypothesized in H9 ( $\beta=-0.262$ ,  $p<0.05$ ), support is found for the negative relationship between the degree of the project risk and team performance. H10 ( $\beta=-0.237$ ,  $p<0.05$ ) is supported by the data that posits that the length of the project is negative to the team performance.

**Table 3**  
**Results of regression analysis of reward characteristics, project characteristics,**  
**and team performance**

Variables	Hypothesis	Speed to market	
		Model 1	Model 2
POS	H1	0.23* (0.05)	0.22* (0.05)
EQU	H2	-0.23 (0.86)	0.01 (0.93)
OUT	H3	0.05 (0.66)	0.05 (0.69)
PRO	H4	0.10 (0.46)	0.20 (0.13)
SHA	H5	0.06 (0.66)	
CAS	H6	0.05 (0.71)	
OFFSHA	H7		-0.21 <sup>+</sup> (0.07)
JUS	H8	0.34** (0.01)	0.40*** (0.01)
RIS	H9	-0.26* (0.04)	-0.24 <sup>+</sup> (0.05)
CYC	H10	-0.24* (0.04)	-0.26* (0.02)
R <sup>2</sup>		0.29	0.32
F-value		2.91** (0.01)	3.82** (0.01)

+p<0.1

\*p<0.05

\*\*p<0.01

\*\*\*p<0.001

Note: the authors report the standardized regression coefficients (t-values are in parentheses).

To sum up, the results in model 2 are similar to those in model 1. In Model 2, H1 ( $\beta=0.217, p<0.05$ ), H8 ( $\beta=0.404, p<0.001$ ), H9 ( $\beta=-0.237, p<0.1$ ), H10 ( $\beta=-0.257, p<0.05$ ) are all supported. H2, H3, H4 are not support. The important difference between two models is that in H7 the authors replaced cash and share-based rewards with a new variable, offering more shares than cash, to test its impact on team performance. Finally, H7( $\beta=-0.21, p<0.1$ ), which hypothesizes offering employees more shares than cash is negatively associated with team, is supported.

## 5. Discussion

### 5.1 Conclusions

In this study, the impacts of reward and project characteristics on team performance are examined. The findings support the hypothesis that position-based rewards and procedure justice are positively related to team performance. Offering employees rewards on the basis of their positions or statues seems to be a good way to motivate people. The results also show that procedure justice plays a significantly positive role in team performance. If employees consider the procedures or rules used to decide their

rewards are fair and objective, they will trust the evaluation system and contribute their efforts. Project risk and the length of project development cycle both are negatively related to team performance. So, the risk and the length of a project might be the critical reasons why team performance is bad.

In addition, equal-based rewards do not have significantly negative effect on team performance. A plausible explanation is that even though Taiwanese employees are not motivated by equal-based rewards, they will not do seriously bad behaviors to harm their team performance. Furthermore, outcome-based and process-based rewards have a surprisingly small effect on team performance. These results might imply that if other things remain equal, employees care more about what amount they can get from firms than what time they can get it. Outcome-based and process-based rewards relate to the timing of getting rewards but not the total amount they can get so they might be not the points that Taiwanese employees care about. The same explanation can be applied to the use of cash or share-based rewards. The payment types do not play critical roles in team performance shows Taiwanese employees might not care

about payment types if other things remain the same.

Most important of all, the results indicate that offering more shares than cash to employees as a reward results in a decrease in team performance. This important finding might further give evidence in support of the notion that the financial benefits of rewards are the most critical thing that employees care about. It also implies that there are some conflicts and contradictions between financial benefits of share-based rewards and the activities of new product development. If new product development activities are risky and difficult, their failures will damage firms' market value and stock price. The more shares employees get, the more risk-avertable they will be. In order to protect their assets, employees might watch their steps and try to maximize their fortune.

## 5.2 Implications for research and practice

Three important practical implications of our study are as follows:

First, Taiwan's high-tech industry firms are used to offering employees shares as rewards; but decision-makers should care about the negative influence it might cause. In this research, the authors find that

offering employees too more shares than cash will negatively relate to team performance. This result implies that reaching a balance between different reward types is an important concern. Although our research data are drawn from Taiwan's high-tech firms, the conclusions could be applied to other industries that use similar reward structures as Taiwan.

Second, procedure justice plays a significantly important role in both models. This indicates that people like to be treated fairly without discrimination. Employees must trust the evaluation and decision system first, and then they will provide their effort. In other words, superior reward designs should always put emphasis on the justice of the system.

Finally, project characteristics as well as reward characteristics influence team performance. It is not right to blame project development teams for failure without taking other objective conditions into account. It appears that rewards designs are not the only factors that determine success.

As to research implications, this research investigates the antecedents of team performance by integrating characteristics of reward structures and the projects themselves. After the operation, the

focus of this paper can go beyond the importance of reward timing and evaluation bases; rather, the authors scrutinize the relatively unknown and under-research impact of payment types, procedure justice, the relative impacts of shares and cash, and project characteristics, especially in Taiwan's high-tech context. This study thus brings relevant evidence to several unsettled debates. Furthermore, their findings would stimulate useful insight in order to expand vision in related academic fields.

### 5.3 Limitations and future research

The limitations of the research also offer several interesting questions for future research. First, this study focuses on the impacts of specific reward structures and project characteristics but does not consider other important incentive systems, such as promotion, overall compensation plan and employee welfare, which also play important roles in team performance. These are interesting issues that could be addressed in further research.

Second, this research discusses the relationships between rewards structures, project characteristics and team performance. It would be interesting for future research to test whether there are

moderating variables (such as personal characteristics and goal complexity) or mediating variables (such as career satisfaction and employee commitment) in those relationships. All these related issues can help managers to use appropriate human resource practices in order to enhance employees' performance and satisfactions.

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