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新產品知識實務對於團隊凝聚力及新產品開發績效之影響
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中文摘要

最近幾年來，在組織中成立跨領域工作團隊(包括研發、行銷及製造部門之成員)，被認為是一項可以更有效促進滿足顧客需求之方法。這種跨領域工作團隊常常被用來做為在產品開發及行銷之過程中能夠整合不同領域之資訊及知識，以期達到更有創造力之工作方法。然而跨領域工作團隊中工作成員之差異性並不一定是一項優點，當這些背景相當分歧的工作成員沒有辦法互相了解及體認對方的考量點時，工作者之學習能力將降低，而使工作之失敗率提高。

本研究提出三項新產品開發團隊之成功因素，包括創業彈性、專案管理能力及工作者之知識。此外，本研究提出以團隊反射能力及產品創新能力為促使新產品開發成效之中介變數。本研究同時也提出以團隊凝聚力及新知識之應用來做為促進團隊反射能力及產品創新能力之干擾變數。本研究認為當工作團隊具有比較高的凝聚力及比較成熟之應用知識能力時，則工作同仁之創業彈性、專業專案管理能力及現有知識對於團隊反射力及產品創新之影響力會大大的提高。

本研究之主要目的在於探討工作團隊反射力及產品創新能力之前置變數及干擾變數。本研究是以網路問卷針對五百位台南科學園區之新產品開發團隊成員進行問卷調查，首先由科學園區高科技公司之人事單位取得相關同仁之 e-mail 並利用 e-mail 與當事人連絡。研究之結果顯示專案管理能力、創業彈性及現有知識對於新產品開發團隊之彈性及產品創新能力有顯著的影響。尤其是當工作團隊具有比較高之團隊凝聚力及知識運用能力時，其影響力會大幅提升。

關鍵字：知識實務，團隊凝聚力，新產品開發績效，創業傾向，專案管理能力，新產品開發知識

ABSTRACT

In recent years, the use of cross-functional teams consisting of members from R&D, marketing and manufacturing department, have played major role to provide balance view of customers' needs in efficient manners. These teams expected to facilitate the product development and marketing process and collaborating with persons from different disciplines to tap a broad array of external information and new knowledge and facilitate the creativity process. However, team functional diversity does not always have positive effects on performance. When teams were unable to recognize and reconcile their different perspectives, they were unable to be successful. Additionally, failure rate in new product development remains high because organizations fail to learn from their past successes and mistakes.

This study uses three antecedents, entrepreneurial proclivity, the project management skills, and existing knowledge, to determine the success of NPD team. There are two mediating variables which used in order to accommodate the processing knowledge, team reflexivity and product innovativeness.

This study also emphasizes the moderating role of team cohesiveness and knowledge practice. This study asserts that team cohesiveness will moderate the level difficulties regarding to the team reflexivity or product innovativeness when the three antecedents influenced it. Moreover, the way of knowledge to be practice in the team, whether collectivity (which represents temporary projects) or community (which represents longer duration projects), will moderate the influence of project management skills, existing knowledge as well as entrepreneurial proclivity on team reflexivity and product innovativeness.

The primary aim of the current study is to advance theoretical discussion of team reflexivity and extend research on three antecedents, project management skills, existing knowledge and entrepreneurial proclivity. Furthermore, the moderating roles of team cohesiveness and knowledge practice are explored in this study. In this study, an on-line questionnaire survey is conducted to 500 R&D team members of NPD team members from three Tainan Science Park. The email address of each respondent is obtained from the human resources department of each high tech company. The findings indicate that project management skills, entrepreneurial proclivity and existing knowledge have significant impact on NPD team reflexivity and product innovativeness. Moreover, this study exhibits that team reflexivity and product innovativeness have prominent role on the success of NPD performance. Finally, both NPD team cohesiveness and knowledge practice play a critical moderating role for the influences of project management skills, entrepreneurial proclivity and existing knowledge on team reflexivity and product innovativeness.

Keywords : *Knowledge Practice; Team Cohesiveness; NPD Performance; entrepreneurial proclivity, project management skills, and existing NPD knowledge*

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I. Research Background and Objectives

New product success has been an important issue in new product development (NPD) research. Previous study indicate that the average success rate of NPD in USA was 59% (Griffin, 1997), whereas 100 ideas lead to 15.2 successful new products. Recent study conducted by Ozer and Chen (2006) by using cross-sectional survey in Hong Kong found that the success rate in Hong Kong is 44.91%, and only 100 ideas lead to 2.15 successful new products. The authors argue that Hong Kong firms use less NPD process, and this is the main reason why US firms seem to be more successful. In addition, it is also important to know the amount of time it takes to develop new products and ways to reduce it. According to Griffin (1997), US firms spend on average 23.8 months to develop an “innovative” new product, however Hong Kong firms from different industries spend on average 12.94 months to develop it (Ozer & Chen, 2006). It is reflecting the fast pace of doing business in Hong Kong, on the other hand, decrease their success level (Ozer, 2006).

In order to enhance the success rate, most of companies heavily rely on cross-functional NPD teams which consisting of members from R&D, marketing, manufacturing, and sales. Its main purpose is to get the balance view of customers' needs in efficient manners (e.g., Denison, Hart, & Kahn, 1996; Griffin, 1997). Cross-functional new product teams are assumed to facilitate the collaboration of product development and marketing process by solving an information-processing problem (Lovelace, Shapiro, & Weingart, 2001). Moreover, cross-functional NPD teams with diversified members' expertise allow them to tap a broad array of external information and new knowledge (Dahlin & Weingart, 1996), and facilitate the creativity process (Woodman, Sawyer, & Griffin, 1993). The use of such teams has been associated with lower development cost, faster speed to market, greater innovation, and better product design and quality (Sarin & Mahajan, 2001). Furthermore, recruiting marketing and manufacturing in NPD teams can facilitate product transfer of the newly developed innovation to manufacturing for its production and to marketing and sales for its distribution (e.g., Griffin, 1997).

However, team functional diversity does not always have positive effects on performance (e.g., Kanter, 1988; Simons, Pelled, & Smith, 1999). Dougherty (1992) argued that diversified background of NPD team members resulted broader perspectives on important product attributes as well as strategies to generate innovative products. When teams were unable to reconcile their different perspectives, the NPD teams as well as the products itself would be unsuccessful. Additionally, the higher rate of failure in NPD remains high if the company fail to learn from their past successes and mistakes (Sarin & McDermott, 2003). It is parallels with the finding of Ancona and Caldwell (1992) which found that managers' ratings of teams' innovativeness were negatively associated with NPD team diversity. According to Lovelace et al. (2001), the degree of unsuccessful team tends to be high when there are not task agreements on team outcomes; and it depends on the liberty of each member to express the doubts of related task and how collaboratively these doubts were expressed.

Previous studies indicated that level of collaboration related with the cohesiveness level of team itself. According to Mudrack (1989), the cohesiveness often is accompanied by feelings of solidarity, harmony, and commitment in its members. Moreover, it can be lubricant “that minimizes the friction due to the human” grit in the system (Mullen & Copper, 1994), and thereby facilitate the pursuit of collective goals (Adler & Kwon, 2002). In order to meet the goals targeted during the development of new product, group members often to face difficulties when they try to coordinate effort and integrate ideas (Hoegl & Parboteeah, 2006). This study asserts that team cohesiveness will moderate the level difficulties regarding to the team reflexivity or product innovativeness when the three antecedents influenced it.

Most of studies which emphasized the role of NPD team focused on team which behaves as community. As remarked by Elias (1974), the use of the term community has ever since been associated with ‘the hope and the wish of reviving once more the closer, warmer, more harmonious type of bonds be-

tween people vaguely attributed to past ages'. The community-behave team categorized by Lindkvist (2005) as knowledge community which practicing their knowledge as a 'tightly knit', 'affect-laden' social structure amounting to 'dense' relationships of mutuality. However, it does not fit squarely with how temporary organizations (Goodman and Goodman, 1976; Meyerson et al., 1996) or project organizations operate (Lindkvist, Söderlund, and Tell, 1998). Typically these kinds of groups consist of diversely skilled individuals, most of whom have not met before, who have to solve a problem or carry out a pre-specified task within tightly set limits as to time and costs. As a result they tend to become less well-developed groups, operating on a minimal basis of shared knowledge and understandings, and Lindkvist (2005) categorized as 'knowledge collectivity'. This study asserts the way of knowledge to be practice in the team, whether collectivity or community (Lindkvist, 2005), will moderate the influence of project management skills, existing knowledge as well as entrepreneurial proclivity on team reflexivity and product innovativeness.

Some scholars proposed that knowledge integration under uncertainty condition is the key success of NPD (Dougherty, 1992; Danneels, 2002). Through effective integration of technological and marketing knowledge, the probability of new products to be success tends to be high (Clark & Fujimoto, 1991; Cooper & Kleinschmidt, 1986; Souder, 1987). To be innovative, a product requires huge amount of information from different functional units, and an effective and efficient information exchange in the NPD process is essential to generate successful outcomes. Each team member should employ information exchange as their reflection, by giving more attention, awareness, monitoring, and evaluation the new product which developed. Moreover, during the reflection, teams will develop planning which creates a conceptual readiness for, and guides team members' attention towards, relevant opportunities for action and means to implement the innovation. Finally, the behavior of team members will be goal-directed relevant to achieving the desired changes in team objective, strategies, processes, or environments identified by the team. The above three dimensions- reflection, planning, and adaptation- is represents the team reflexivity as proposed by West (1996, 2000, 2002).

The study conducted by Hoegl and Parboteeah (2006) indicated that social skills and project management skills of R&D team can generate better team reflexivity. This study will be adopting the project management skills as one of the determinants of team reflexivity. Project management skills are necessary for flexible planning and ongoing controlling of the task process, which is of particular importance in the case of innovative projects, given their high degree of task-related uncertainty and complexity. Existing knowledge will be the second determinants of team reflexivity. This study adopted the approach of Brockman and Morgan (2006) that existing knowledge similar with organizational memory proposed by Moorman and Miner (1997) and defined as collective basis, behavioral routines, or psychological artifacts that vary in their content, level, dispersion, and accessibility. The ability of team members to be reflexive will depends on the knowledge that each member has. Moreover, in the adaptation dimensions of reflexivity, entrepreneurial proclivity will play the main role by engaging the team to be risk-taking and more proactive in order to meet customers' needs as well as creating competitive advantage.

Another pivotal role of the success of new product development is product innovativeness. It refers to product advantage which customer-perceived superiority as to quality, benefit, and functionality (Montoya-Weiss & Calantone, 1994), and product uniqueness/superiority (Cooper & Kleinschmidt, 1987). Moreover, it also refers to product newness as a new product platform or to contain new modules for an existing product (Jordan & Segelod, 2006). The innovativeness of the product also can lead to the formation of new business unit(s), the extension of other product lines or the introduction of improvements into other product lines (Jordan & Segelod, 2006). This study adopted that the degree of product innovativeness will be influenced by entrepreneurial proclivity of the NPD team (Sethi, Smith, & Park, 2001). The project management skills also become the determinants of innovativeness when the plan-

ning and controlling skills necessary during the development of new product (Gladstein, 1984). Finally, existing knowledge of each team members contribute on the degree of product innovativeness (Brockman & Morgan, 2006).

The primary aim of the current study is to advance West (1996, 2000, 2002) and Hoegl and Parboteeah (2006) theoretical discussion of team reflexivity and extend research on three antecedents, project management skills, existing knowledge and entrepreneurial proclivity. Moreover, this study emphasizes the extent of team members collectively reflect on and adapt their team’s objectives, strategies, and processes on the product innovativeness as well as new product performance. Furthermore, the moderating role of team cohesiveness and knowledge practice will be explored in this study.

Since previous studies do not integrate the above constructs into a more comprehensive framework, this study will fill this research gap and develop some research hypotheses for empirical validation. Specifically, the purposes of this study are as follows:

- (1) To evaluate the influences of project management skills, existing knowledge and entrepreneurial proclivity of NPD team members on team reflexivity and product innovativeness;
- (2) To evaluate the influence of team reflexivity on product innovativeness and new product performance;
- (3) To evaluate the influence of product innovativeness on new product performance;
- (4) To evaluate the moderating effects of the following relationships:
 - a. The moderating effects of team cohesiveness on the influence of project management skills, existing knowledge and entrepreneurial proclivity of NPD team members on team reflexivity and product innovativeness;
 - b. The moderating effects of knowledge practice on the influence of project management skills, existing knowledge and entrepreneurial proclivity of NPD team members on team reflexivity and product innovativeness;

Specifically, the research framework of this study is depicted in Figure 1.

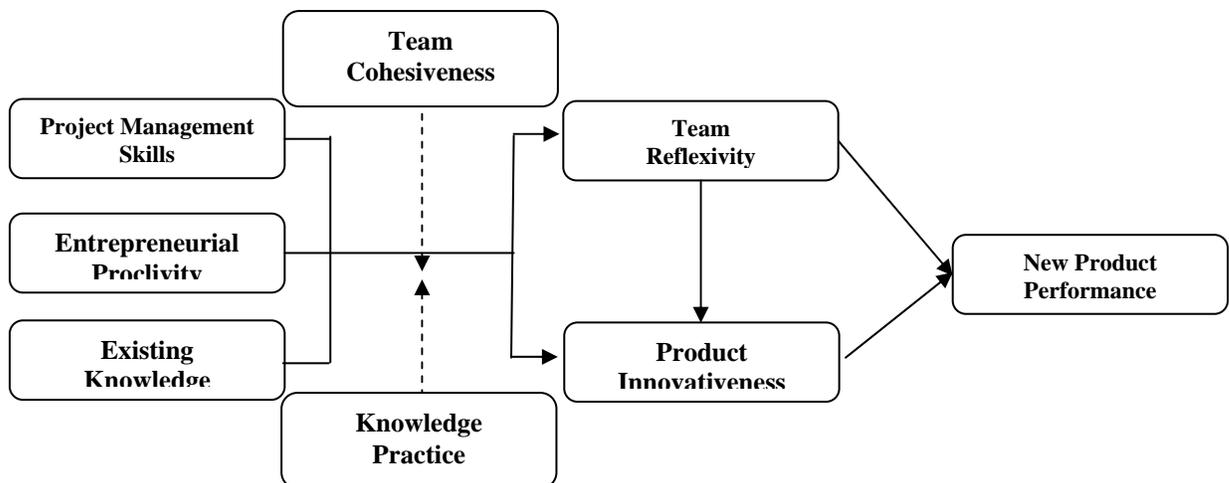


Figure 1. The research framework of this study

II. Literature Review

2.1 Definition of Research Constructs

2.1.1. Entrepreneurial Proclivity

In the original article, Miller (1983) used the three dimensions of innovativeness, risk taking, and proactiveness to characterize the degree of an organization's entrepreneurial proclivity. Several researchers have adopted an approach based on Miller's (1983) original conceptualization to describe the attitudinal predisposition to entrepreneurship, or entrepreneurial proclivity (e.g., Covin & Slevin 1991; Naman & Slevin 1993), or entrepreneurial orientation (e.g., Lumpkin & Dess, 1996; Lyon, Lumpkin, & Dess, 2000). This study will follow the definition proposed by Matsuno, Mentzer, and Ozsomer (2002) which they defined entrepreneurial proclivity as the organization's predisposition to accept entrepreneurial processes, practices, and decision making, characterized by its preference for innovativeness, risk taking, and proactiveness.

The terms of entrepreneurial proclivity is similar with entrepreneurial orientation, which refers to propensity to act autonomously, innovate, take risks, aggressive, and act proactively when confronted with market opportunities (Lumpkin & Dess, 1996). It different with entrepreneurship, because it emphasize on the process which focused on “methods, practices, and decision-making styles managers use” (Lumpkin & Dess, 1996), and it tend to be strategic orientation (Wiklund & Shepherd, 2003) of an entrepreneurially-oriented firm. An entrepreneurial orientation promotes initiative (Burgelman, 1983) and what Birkinshaw (1997) called “dispersed” entrepreneurship, which is the involvement of multiple management levels in the formulation and implementation of entrepreneurial strategies. An entrepreneurial orientation is not created or imposed by top management, but reflects the strategic posture as exhibited by multiple layers of management (Stevenson & Jarillo, 1990).

This study asserts that entrepreneurial proclivity has three dimensions, how do the organizational members open to new ideas (innovativeness), how do they willing to take risks, and how do they actively to be creative to enhance organizational performance. When the organization has higher entrepreneurial proclivity, it can be expected that their innovation level will be high, since the members and managers as well as owners has willingness to be proactive when the market change and take a risk to challenge the customer needs. On the other hand, this study assumed that it will influence negatively on the level of team reflexivity. Furthermore, this study will explore whether team reflexivity can serve as mediator in order to reduce the undesired outcomes of entrepreneurial proclivity to enhance the innovation level of the team.

2.1.2. Project Management Skills

Project management skills refer to team members' abilities to plan and control projects. This includes abilities to structure the team task and to plan the workflow (Gladstein, 1984). To be effective, teams must organize themselves in a way that allows all team members to work simultaneously without gaps and overlaps (Stevens & Campion, 1994). Project management skills are necessary for flexible planning and ongoing controlling of the task process, which is of particular importance in the case of innovative projects, given their high degree of task-related uncertainty and complexity. This study follow the Hoegl and Parboteeah's (2006) argument that a team's project management skills are positively related to team reflexivity, as a high level of task structuring and coordination offers the basis for, and likely prompts the awareness of, its current work status relative to given quality, budget, and schedule expectations. As such, teams that have the skills to properly structure and control their task processes will likely demonstrate higher levels of team reflexivity, scanning internal and external environments for

feedback based on proper information regarding current task status, routinely re-evaluate chosen task strategies and are prepared to alter them if the situation calls for such action.

2.1.3. Existing Knowledge

Existing knowledge similar with organizational memory proposed by Moorman and Miner (1997) which defined as collective basis, behavioral routines, or psychological artifacts that vary in their content, level, dispersion, and accessibility (Brockman & Morgan, 2006). It has been recognized as an essential component of organizational learning (Slater & Narver 1995); the depth and breadth of an existing knowledge base determines how easily new information is incorporated. Because NPD is considered an organizational learning process (Leonard-Barton 1992), research on the role of existing knowledge in NPD is relevant. According to Moorman and Miner (1997), the link between existing knowledge and new product innovativeness and found an insignificant relationship between the two variables. However, this study assumed that organizational memory which refers to collective basis or behavioral routines in the organizations play determinant role of product innovativeness. Moreover, it assumed that these behaviors will determine the level of team reflexivity in the new product development project.

2.1.4. Team Reflexivity

Group members face obstacles as they try to coordinate effort, strengthen interpersonal relationships, and integrate ideas. Groups need considerable management to identify frustrations and develop and implement solutions. West (1996, 2000, 2002) has labeled this group management as team reflexivity and defined it as the extent to which team members collectively reflect on and adapt their team's objectives, strategies, and processes. Teams monitor and become aware of how they work together and develop and implement improvement plans. Reflexivity would also seem to require a degree of entitativity, which is the extent to which group members believe themselves to be one unit (Lickel, Hamilton, & Sherman, 2001). Reflexivity is expected to help teams know their actual workings and develop new understandings and methods that respond to emerging conditions and challenges (Carter & West, 1998). Reflexivity is especially useful for groups working on challenging tasks and operating in complex environments. The major implication is that to the extent that teams engage in reflexivity are able to continue to perform effectively (Frese & Zapf, 1994; Johnson, Johnson, Stanne, & Garibaldi, 1990), and can keep groups focused and efficient.

According to West (1996, 2000, 2002), there are three central elements to the concept of reflexivity—reflection, planning, and action or adaptation. Reflection consists of attention, awareness, monitoring, and evaluation of the object of reflection. Planning is one of the potential consequences of the indeterminacy of reflection, since during this indeterminacy, courses of action can be contemplated, intentions formed, plans developed (in more or less detail), and the potential for carrying them out is built up. High reflexivity exists when team planning is characterized by greater detail, inclusiveness of potential problems, hierarchical ordering of plans, and long as well as short range planning. The more detailed the implementation plans, the greater the likelihood that they will manifest in innovation (Frese & Zapf, 1994; Gollwitzer, 1996). Indeed the work of Gollwitzer and colleagues suggests that innovation will be implemented almost only when the team has articulated implementation intentions. This is because planning creates a conceptual readiness for, and guides team members' attention towards, relevant opportunities for action and means to implement the innovation. Action refers to goal-directed behaviors relevant to achieving the desired changes in team objective, strategies, processes, organizations, or environments identified by the team. In a variety of studies links between reflexivity and team innovation and effectiveness have been demonstrated (Carter & West, 1998; West, Patterson, & Dawson, 1999; Bor-

rill et al., 2000). This study uses these dimensions - reflection, planning, and action or adaptation – to represent the team reflexivity which will influence the product innovativeness of NPD teams resulted as well as the new product performance.

2.1.5. Product Innovativeness

A review of the literature reveals conflicting findings on the relationship between new product innovativeness and performance, which defined as a new product's level of profitability relative to its objective during the first 12 months of its life in the marketplace (Jordan & Segelod, 2006). Booz, Allen and Hamilton's (1982) study classified new products into one of six categories: new-to-the-world products, new product lines, additions to existing product lines, revisions to existing products, repositioning, and cost reduction. The study concluded that the first two categories make up only 30 percent of new product introductions but 60 percent of high-performing new products. Similarly, Ettl and Rubenstein (1987) found that large firms are more likely than small firms to introduce highly innovative products, which in turn are more likely to outperform incremental ones.

In a more recent study, however, Kleinschmidt and Cooper (1991) reported a U-shaped relationship between the degree of innovativeness and the success of new products. The rationale behind these results is that innovative products offer differentiation, whereas incremental products provide firm-product synergies and marketing proficiencies. Kleinschmidt and Cooper (1991) argued that products that fall in between on the innovativeness scale cannot provide either of these advantages. Song and Parry (1999) considered product innovativeness a moderating variable and found that it weakened three important relationships in NPD: (1) technical synergy–technical proficiency, (2) technical proficiency–product competitive advantage, and (3) product competitive advantage–new product success.

According to Jordan and Segelod (2006), there are three dimensions of product innovativeness: product advantage, product newness, and structural change within the firm. Product advantage refers to customer-perceived superiority as to quality, benefit, and functionality (Montoya-Weiss & Calantone, 1994), and product uniqueness/superiority (Cooper & Kleinschmidt, 1987). Product newness refers to the extent to which the new product was considered to be a new product platform or to contain new modules for an existing product. Finally, structural change often happened when innovative products can lead to the formation of new business unit(s), the extension of other product lines or the introduction of improvements into other product lines. It also can be reflected when the firm extend other product lines to represent innovativeness. This study follows Jordan and Segelod (2006) and determines product innovativeness by using these three dimensions and assumed that it can be affects on the success rate of NPD.

2.1.6. New Product Performance

New product performance defined by Marsh and Stock (2006) as company's innovative capabilities, product quality, and efficiency of the firm's on their new product. Song and Montoya-Weiss (1998) measured new product performance as the degree to which a product met a firm's profit objectives; they found that really new products outperform incremental products in this capacity. By emphasizing on innovativeness, a firm invests substantially in R&D and aims to be the first to bring the innovative product to market (Green, Barclay, & Ryans, 1995; Lieberman & Montgomery, 1988; Schnaars, 1994). Such a move may benefit the firm in various ways. For example, a first mover may achieve economic benefits such as scale and experience economies (Robinson & Fornell, 1985). Being a pioneer also can earn a firm advantage because it can preempt its rivals in the acquisition of scarce resources, such as the most attractive space or locations (Lieberman & Montgomery, 1988). Innovating firms can gain advantage

through sustained technology leadership (Kerin et al., 1992). Studies on new product performance have suggested that product innovativeness provides competitive product advantage by enhancing novel and useful perspectives of the product (e.g., Song & Montoya-Weiss 2001; Song & Parry 1999). A creative firm that provides unique and meaningful products and programs will meet the changing needs of consumers by generating highly innovative and superior products and programs in the market (Cooper 1979; Deshpandé, Farley, & Webster 1993). This study asserts that product innovativeness is major determinants of new product performance (Griffin & Page, 1996; Im & Workman, 2004).

2.1.7. Organizational Cohesiveness

The cohesiveness of group has been attracted scholars to study in variety settings, where the concept of ‘togetherness’ is particularly relevant, such as in sports teams, military units, or study groups (Wang, Ying, Jiang, & Klein, 2006). The group can be cohesive when they stick together—one whose members are bonded to one another, and to the group as a whole. Cohesiveness often is accompanied by feelings of solidarity, harmony, and commitment in its members (Mudrack, 1989). Other traits typically associated with cohesive group include ‘connectedness’, ‘strong ties’, and ‘unitedness’ (Granovetter, 1973; Widmeyer, Brawley, & Carron, 1985). Group cohesion is good to represents socio-psychological variables present in the study of groups (Goodman, Ravlin, & Schminke, 1987). According to Mullen and Copper (1994), they suggested that group cohesion is a ‘lubricant’ that minimizes the friction due to the human ‘grit’ in the system.

This study based on the theory of social capital which assumed that internal relations create value by facilitating successful collective action, such as in a project team represents social capital (Kostove & Roth, 2003; Reagans & Zuckerman, 2001). Here, the social capital of a collectivity is “in its internal structure—in the linkages among individuals or groups within the collectivity and, specifically, in those features that give the collectivity cohesiveness and thereby facilitate the pursuit of collective goals” (Adler & Kwon, 2002).

2.1.8. Knowledge Practice

The term of Community-of-Practice (CmP) has been proposed by Wenger (1998) as to represents practices that give rise to mutual engagement, joint enterprise and a shared repertoire. The notion of mutual engagement is related to the idea of ‘strong ties’ in network theory and that people in CmPs trust each other both personally and regarding their competences (Wenger, 2000). This proposition closed to the sociology of Tönnies (1887/1955), as noticed by Brown and Duguid (2001). For Tönnies, the community referred to the old better days, to be found in village and small town settings where enduring social relations of intimacy and solidarity could prevail, whereas the association signified society and business life introducing impersonal, fleeting and contractual relations. As remarked by Elias (1974), the use of the term community has ever since been associated with ‘the hope and the wish of reviving once more the closer, warmer, more harmonious type of bonds between people vaguely attributed to past ages’. Even some scholars viewed that community has some drawbacks, such as mechanical solidarity (Durkheim, 1893/1984) and expropriates the individual’s moral responsibility (Bauman, 1991); but still positive connotations appear dominate the meaning of community (Williams, 1992).

In his recent paper, Lindkvist (2005) characterized a CmP as a ‘tightly knit’, ‘affect-laden’ social structure amounting to ‘dense’ relationships of mutuality. Apparently, it is characterized by a ‘high degree’ of shared understandings and shared repertoire. Moreover, the kind of practices involve a ‘significant amount’ of face-to-face encounters and an ‘extended’ time period of ‘local interaction’ among

those practicing together, without being subjected to outsiders or hierarchical requests. This conveys the notion of group members knowing approximately the same things, experiencing things similarly, by having a common worldview as knowledge base of knowledge community. Furthermore, the organizational knowledge dominates while individuals, masters as well as apprentices, tend to take on the character of situated personas. It means each individual or members of the organization only playing the role that organization asks. The experience-based knowledge will reveal itself only during practice, and practicing together is the way newcomers may learn the tricks of the trade. In particular newcomers tend to rely on imitation, simply trusting that others do the right thing or that prevailing routines are efficient.

The community practice has been used to represent team when they work in the organization. However, it does not fit squarely with how temporary organizations (Goodman & Goodman, 1976; Meyerson et al., 1996) or project organizations operate (Lindkvist, Söderlund, & Tell, 1998). There is also a growing literature on project-based firms, mirroring the fact that many service-providing as well as technology-based firms organize their operational and development activities in projects (DeFillippi & Arthur, 1998; Gann & Salter, 2000; Hobday, 2000; Sydow et al., 2004). Typically these kinds of groups consist of diversely skilled individuals, most of whom have not met before, who have to solve a problem or carry out a pre-specified task within tightly set limits as to time and costs. As a result they tend to become less well-developed groups, operating on a minimal basis of shared knowledge and understandings, and Lindkvist (2005) categorized as ‘knowledge collectivity’.

According to Mintzberg (1979), the use of multidisciplinary teams is a characteristic of organizations with an adhocratic design. Adhocracies tend to group the specialists in functional units and deploy them in ‘small market-based project teams’. Within a similar line of inquiry Goodman and Goodman (1976) discuss temporary systems as a ‘set of diversely skilled people working together on a complex task over a limited period of time’. In such a ‘strong goal’ context a task orientation, rather than social or emotional ties, is promoted. Yet, it is important that individuals help each other. As a result, considerable autonomy is granted, but members should also deliver. Entrepreneurial activity and creative knowledge generation become both a possibility and a duty.

While ‘what’ to achieve is typically well specified a priori, ‘how’ the project should be run is up to the project leader and the project team to decide. It is a matter of ‘freedom with responsibility’ as is often stated. Although project groups will not be well-developed groups in the traditional sense, with shared values and common understandings, their members may be well-connected. Project groups, with members that embrace a collective goal and have good representations of what the others know, may thus, based on quite a minimalist base of shared knowledge, develop a pattern of interaction and the collective competence needed. Resonating with the greater reliance of such groups on individual knowledge, agency and goal-directed interaction, they may be designated ‘collectivities of practice’.

According to Lindkvist (2005), knowledge collectivity refers to the ability of a team or an organization to operate on ‘distributed’ knowledge. Specific project goals have a role as a kind of ‘boundary objects’ (Star, 1993) that are robust enough to establish a common point of reference in order to achieve the goals (Lindkvist et al., 1998) and provide explicitly stated guidance as to what new knowledge is needed, what solutions are feasible within limits set as to time and money (Lindkvist, 2005). The team or organization will rely on informal ‘network memory’ infrastructure thus tend to let knowledge ‘stay in place’ and encourage people to learn how to search for relevant knowledge (Lindkvist, 2004). Furthermore, under dynamic circumstances, the members will be more look outwards, to what customers want, to the task at hand and forward at what might be achieved. Relying on their knowledge of ‘who knows what’, they approach others with their problems and their ideas about possible solutions, hoping that the experience, knowledge, intuitions or criticism of others would help them change their way of thinking about their problems, entering new, more promising lines. Compare to knowledge community, greater

reliance is placed on individual agency in the knowledge collectivity (Lindkvist, 2005). Each member will compete for attention and continuously look for new ideas and criticism that might help them solve their problems. While their fellows in the knowledge community are ‘enculturated’, the individuals in the knowledge collectivity may promote creativity and flexibility, counteracting both groupthink (Janis & Mann, 1977) and the emergence of core rigidities (Leonard-Barton, 1992). However, as reported by Keegan and Turner (2002) a strong focus on the need to keep deadlines, milestone goals, costs and the like, may also result in a ‘project culture’, where slack and innovative activity are perceived as ‘costly and dangerous’.

2.2 Hypotheses Development

2.2.1. The Determinants of Team Reflexivity

When develop new products, each team members working on challenging tasks and operating in complex environments, and reflexivity is useful for teams to generate better and creative ideas. By engaging on team reflexivity, the members know their actual workings and develop new understandings and methods that respond to emerging conditions and challenges (Carter & West, 1998). This condition will be facilitated by entrepreneurial proclivity by accepting entrepreneurial processes actively to be adapting on dynamic environment change (Matsuno et al., 2002). The major implication is that to the extent that teams engage in reflexivity are able to continue to perform effectively (Frese & Zapf, 1994; Johnson, Johnson, Stanne, & Garibaldi, 1990), and can keep groups focused and efficient. The study conducted by Hoegl and Parboteeah (2006) indicated that current project management skills positively significant influence the level of team reflexivity. The higher reflexivity of team work resulted on the detail of planning, covering potential problems, and organizing the implementation of planning, whether it is long as well as short range planning. The more detailed the implementation plans, the greater the likelihood that they will manifest in innovation (Frese & Zapf, 1994; Gollwitzer, 1996). The detail planning and better implementation need existing knowledge of each members and codify it from collective basis or behavioral routines in the organizations.

H1-a: Project management skills have positive influence on the team reflexivity

H1-b: Entrepreneurial proclivity has positive influence on the team reflexivity

H1-c: Existing knowledge has positive influence on the team reflexivity

2.2.2. The Determinants of Product Innovativeness

In order to be effective, NPD teams require organizing themselves by allowing all team members to work simultaneously without gaps and overlaps (Stevens & Campion, 1994). Project management skills are necessary for flexible planning and ongoing controlling of the task process, which is of particular importance in the case of innovative projects, given their high degree of task-related uncertainty and complexity. When it happens, it can be expected that project management skills facilitate the higher product innovativeness. Moreover, when the team engaged on propensity to act autonomously and proactively as well as willing to take a risk when confronted with market opportunities (Lumpkin & Dess, 1996), it can be expected that the degree of innovativeness of new product will be enhanced. This proposition parallels with the study of Sethi et al. (2001) that risk taking attitude of team members can lead to higher product innovativeness. Finally, existing knowledge which holds by each team members of NPD could be expected to have influence on the product innovativeness, since the collective basis or behav-

ioral routines (Moorman & Miner, 1997) will direct NPD teams to be more effective. Based on that, the following hypotheses will be tested:

H2-a: Project management skills have positive influence on the product innovativeness

H2-b: Entrepreneurial proclivity has positive influence on the product innovativeness

H2-c: Existing knowledge has positive influence on the product innovativeness

2.2.3. The Influences of Team Reflexivity on Product Innovativeness and Product Performance

Organizations are increasingly relying on teams to innovate and respond to the rapidly changing marketplace (Edmondson, 1999; West, 2002). However, developing teams that can be effective has proved to be a difficult that require them to be able to maintain and strengthen themselves if they are going to innovate (Lewicki & Wiethoff, 2000; Tjosvold, 1991; West, 2002). In the low unit level in the organization, teams can promote innovation in organizations to the extent that they can manage their internal functioning. Reflexive teams are also likely to make better use of the expertise of team members and thus achieve better project success. Moreover, higher levels of reflexivity allow team members to be more aware of their fellow team members' expertise and skills. Such deeper knowledge of team strength and weakness is likely to lead to better innovation as expertise is distributed in the most appropriate way. The study by Carter and West (1998) and Tjosvold et al. (2004) indicated that team reflexivity is the major determinants of team innovativeness. Together with cooperative goals, team reflexivity provides better foundation when the team required being innovative team.

In the innovative team project, it is often face high task variety (Gales et. al., 1992) and low task analyzability (Daft & Lengel, 1986); which potentially disruptions the team when the tension of unpredictability is high. Team reflexivity is very likely to be helpful in dealing with this situation. The constant self-reflection fosters the ongoing collection and sharing of information that is so critical to project success (Sicotte & Langley, 2000). Because reflexivity involves each team member to present their accounts of the situation, they are less likely to be judgmental about ideas of NPD and more likely to find the best solution to problems (Rogelberg et al., 1992). The information sharing within the team (Hoegl & Gemuenden, 2001; Sethi and Nicholson, 2001) and across the team (Ancona & Caldwell, 1990) is likely to result in better team performance as all team members are better informed about problems they are facing and ways to solve them in NPD (Hoegl & Parboteeah, 2006). Using data of 145 software development teams, Hoegl and Parboteeah (2006) found that team reflexivity is positively related to team effectiveness. In terms of new product development, it can be expected that under high team reflexivity, the new product development could be resulted on better performance in the market. Based on the above literatures, this study proposed the following hypotheses:

H3-a: Team reflexivity has positive influence on product innovativeness

H3-b: Team reflexivity has positive influence on new product performance

2.2.4. The Influences of Product Innovativeness on Product Performance

One dimension of product innovativeness is product advantage, which refers to customer-perceived superiority as to quality, benefit, and functionality and has been noted as a strategic factor that drives new product performance (Montoya-Weiss & Calantone, 1994). Moreover, product innovativeness has been suggested as major determinants of new product performance (Griffin & Page, 1996; Im & Workman, 2004). And recent study conducted by Zhou (2006) indicated that product innovativeness will lead to better new product performance. Moreover, by comparing with imitation strategy, this cross-industry survey indicated that product innovativeness superior to imitation strategy. Therefore, this study proposed the following hypothesis:

H4: Product innovativeness has positive influence on new product performance

2.2.5. The Moderating Effects of Team Cohesiveness

NPD projects require major task interdependence and substantial cross-functional interaction. For an organization to use its knowledge effectively to obtain innovative information, it must engage a culture that encourages open communication and, most important, the acceptance of new ideas and different perspectives. In a general sense, cohesive cultures discourage opposing viewpoints (Deshpandé et al., 1993). Research on dominant logic (Bettis & Prahalad 1995) and core rigidities (Leonard-Barton 1992) helps explain the lack of correlation between existing knowledge and innovative information that occurs without an organizational culture that encourages autonomy, the acceptance of risk, honest communication, and the acceptance of conflict. These important factors do not typically exist in cultures with high cohesiveness, such as the clan culture, which makes it unlikely for existing knowledge to assist such firms in acquiring innovative information. In contrast, organizations with low cohesiveness are less likely to be immersed in tradition and loyalty, which makes it easier for them to break away from their current perspectives and use their existing knowledge to help recognize the value of innovative information. According to Sethi et al. (2001), group cohesion tends to decrease the innovativeness level of team when it is beyond a moderate level. Moreover, the study of Brockman and Morgan (2006) indicated that team cohesiveness moderate the level of existing knowledge on product innovativeness. Based on that discussion, the following hypotheses proposed:

H5-a: The level of team cohesiveness will moderate the influence of project management skills on team reflexivity and product innovativeness

H5-b: The level of team cohesiveness will moderate the influence of entrepreneurial proclivity on team reflexivity and product innovativeness

H5-c: The level of team cohesiveness will moderate the influence of existing knowledge on team reflexivity and product innovativeness

2.2.6. The Moderating Effects of Knowledge Practice

According to Lindkvist (2005), in the team which applied knowledge collectivity, the members tend to be more creative and engage on entrepreneurial activities which lead to higher product innovativeness and more reflexive. In other words, when the R&D team practices their knowledge as community, it can be expected that the influence level of risk taking and proactiveness will be moderated on team reflexivity and product innovativeness. Moreover, since the team relies on informal 'network memory' infrastructure thus tend to let knowledge, either project management skills and existing knowledge, 'stay in place' and discourage members to learn how to search for relevant knowledge community practice (Lindkvist, 2004). Thus, this study posits the influence of project management skills and existing knowledge on team reflexivity and product innovativeness. Based on that discussion, the following hypotheses proposed:

H6-a: When the team practices their knowledge as community, it will moderate the influence of project management skills on team reflexivity and product innovativeness

H6-b: When the team practices their knowledge as community, it will moderate the influence of entrepreneurial proclivity on team reflexivity and product innovativeness

H6-c: When the team practices their knowledge as community, it will moderate the influence of existing knowledge on team reflexivity and product innovativeness

III. Research Design and Methodology

3.1 Research Model

There are two purposes of this study: First, to identify the antecedents and consequences of CQ for team reflexivity in NPD teams. The antecedents are project management skills and existing knowledge which reflects on tacit knowledge of teams; whereas entrepreneurial proclivity represents the eagerness of teams' member to acquire and disperse their tacit knowledge among their team members which will enhance the level of team reflexivity. The consequences of team reflexivity are product innovativeness as well as new product performance. The second purpose of this study is to evaluate the moderating effects of team cohesiveness and knowledge practice on the relationship of the research constructs. The following fourteen hypotheses are developed in this study for further empirical validation.

H1-a: Project management skills have positive influence on the team reflexivity

H1-b: Entrepreneurial proclivities have negative influence on the team reflexivity

H1-c: Existing knowledge has positive influence on the team reflexivity

H2-a: Project management skills have positive influence on the product innovativeness

H2-b: Entrepreneurial proclivities have positive influence on the product innovativeness

H2-c: Existing knowledge has positive influence on the product innovativeness

H3-a: Team reflexivity has positive influence on product innovativeness

H3-b: Team reflexivity has positive influence on new product performance

H4: Product innovativeness has positive influence on new product performance

H5-a: The level of team cohesiveness will moderate the influence of project management skills on team reflexivity and product innovativeness

H5-b: The level of team cohesiveness will moderate the influence of entrepreneurial proclivity on team reflexivity and product innovativeness

H5-c: The level of team cohesiveness will moderate the influence of existing knowledge on team reflexivity and product innovativeness

H6-a: The level of knowledge practice will moderate the influence of project management skills on team reflexivity and product innovativeness

H6-b: The level of knowledge practice will moderate the influence of entrepreneurial proclivity on team reflexivity and product innovativeness

H6-c: The level of knowledge practice will moderate the influence of existing knowledge on team reflexivity and product innovativeness

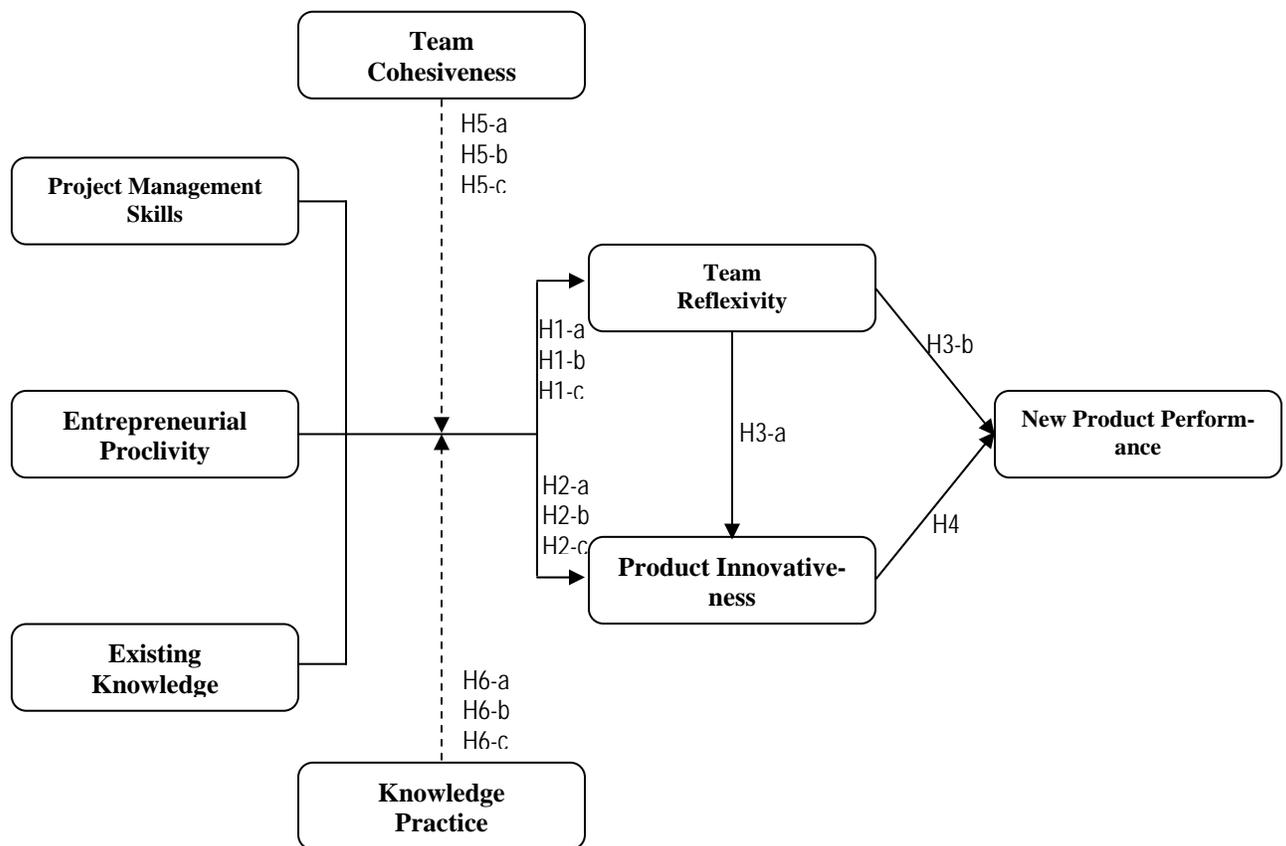


Figure 2. The research framework of this study

3.2 Participants and Sampling Plan

In this study, on-line questionnaire surveys will be conducted to 100 R&D team of new product development (NPD team, which consist 1 team leader and 4 team members), totally 500 respondents from Tainan Science Park. The email address of each respondent will be obtained from the Human Resources department of each high tech company in Tainan Science Park. The survey material will include a cover letter from researcher and university-addressed. They will be asked to express their opinions about their level of the antecedents of team reflexivity and their product innovativeness as well as new product performance and other two moderating variables to follow up and to ask for their responses. Respondents will promise complete anonymity of any information that they submitted. Because of the nature of the data collection (i.e., cold-email, demanding, and lengthy surveys that required distribution to specific social referents by expatriates), this study will offer a “lucky draw” incentive for a free buffet (for 4 people) at an international five-star hotel in Tainan.

3.3 Research Design

This study will adopt a survey approach to collect relevant research data. The qualified sample will be selected based on the selection criteria previously stated. For each company, the human resource manager will be asked through telephone calls to identify a representative R&D team as the subject of this study. The survey questionnaires will be sending to the representative R&D team to be completed.

3.4 Construct Measurement

Survey questionnaire items will be designed based on the review of literature and the purpose of this study. Research items for the following nine constructs will be developed:

1. ***Project management skills, which potential questionnaire items are as follows (Gladstein, 1984; Hoegl & Parboteeah, 2006):***

- (1) The team had the necessary skills for planning the project (e.g. setting subgoals, structuring the work, etc.).
- (2) The team had the necessary skills to control the progress of the project.

2. ***Entrepreneurial proclivity, which potential questionnaire items are as follows (Matsuno *et al.*, 2002; Lumpkin & Dess, 1996; Dess, Lumpkin, & Covin, 1997; Griffith, Noble, & Chen, 2006):***

Top managers at our firm

- (1) Encourage the development of innovative strategies, knowing some will fail
- (2) Value creative solutions more than the solutions of conventional wisdom
- (3) Tend to talk more about opportunities than problems
- (4) Treat most people the same regardless of rank or status
- (5) Typically adopt a very competitive “undo-the-competition”
- (6) Are very aggressive and very competitive

3. Existing knowledge, which potential questionnaire items are as follows (Moorman & Miner, 1997; Brockman & Morgan, 2006):

Prior to the project, compared with firms in our industry, my organization had...

- (1) A great deal of knowledge about this product category.
- (2) A great deal of information about this product category.
- (3) A strong understanding of this product category.
- (4) A great deal of insight regarding this product category.

4. Team reflexivity, which potential questionnaire items are as follows (Hoegl & Parboteeah, 2006):

- (1) My team investigated and observed the context and the progress of our project (e.g. task performance strategies, goals, project requirements, the organizational context, etc.).
- (2) My team adjusted its task performance strategies in response to changes in the context and progress of the project.
- (3) My team spent an adequate amount of time considering the likely consequences of its task activities (e.g. considerations regarding usability of the product, compatibility with other products, cost, etc.).
- (4) Strategies and work approaches chosen were later checked for their appropriateness.
- (5) My team learned from its experiences.

5. Product Innovativeness, which potential questionnaire items are as follows (Jordan & Segelod, 2006):

- (1) Uniqueness of the product benefits:
 - Feature set differences over the closest prior developed product
 - Product performance compared to closest available competitive product in the relevant market segment
- (2) Scope of newness:
 - New product platform
 - New modules for an existing product
- (3) Product newness opinions as to the firm:
 - To the project team
 - To company management
- (4) Product newness as to the market:
 - To the customers
 - To the competitors
- (5) Formation of new business unit for the local product

- (6) Number of product line extensions
- (7) Number of improvements to other product lines

6. *New Product Performance, which potential questionnaire items are as follows (Brown & Eisenhardt, 1995; Dougherty & Hardy, 1996; Cooper & Kleinschmidt, 1986; Verona, 1999, Marsh & Stock, 2006):*

- (1) New products do not provide a significant source of revenues for the company (reverse coded).
- (2) Our company develops better products than its competitors.
- (3) Over time, we continually improve our product development processes.
- (4) Our company is more innovative than its competitors.
- (5) Our company consistently meets our technical objective in new product development.

7. *Team cohesiveness, which potential questionnaire items are as follows (Widmeyer, Brawley, & Carron, 1985)*

In general, the management philosophy in my organization emphasizes...

- (1) United employee effort in trying to reach the goals for the organization.
- (2) That employees work together as a team
- (3) That all employees take responsibility for poor business performance
- (4) That all employees share similar aspirations for the unit's performance
- (5) That everyone pitches in and helps if a few members of the unit have difficulty solving a work problem.

8. *Knowledge practice, which potential questionnaire items are as follows (Lindkvist, 2005):*

As a team member, I:

- (1) Socialize through communal activity, such as sport activities regularly;
- (2) Know exactly the knowledge have been developed in our company;
- (3) Think each member's knowledge background is similar;
- (4) Share my knowledge when the leader asks to share it;
- (5) Described our team behave like community;
- (6) Let newcomers learn the existing knowledge by practicing with me;
- (7) Search relevant knowledge proactively to get the project done;
- (8) Often to use trial and error in order to solve the problem;
- (9) Learn new knowledge in the problem solving process;
- (10) Described our team goal-directed

9. *Demographic information of each respondent (8 items).*

A preliminary version of this questionnaire will be designed by this author. An expert interview will be conducted to investigate the representatives of the questionnaire item that fit into the actual content of expatriation activities. The final version of questionnaire items will be refined through a process of puri-

fication including factor analysis, item-to-total correlation, and Cronbach's alpha. It is expected that 100 R&D team of new product development (NPD team, which consist 1 team leader and 4 team members), totally 500 respondents from Tainan Science Park will join this study. The respondents will be asked to express their skills related with project management, how are their current knowledge, their degree of entrepreneurial proclivity, how often they do reflexivity, how do they behave as a team (in terms of cohesiveness), how do they practice their knowledge within and between their team members, how new is the innovativeness of their product, and finally the new product performance which they developed.

3.5 Data Analysis Procedures

In order to achieve the purposes of this study and to test the hypotheses, SPSS 13.0 and AMOS 5.0 software will be employed to analyze the collected data. The following data analysis methods will be tested (see Figure 3):

3.5.1 Descriptive Statistic Analysis

Descriptive statistic analysis will be used to illustrate the means, and standard deviation and frequency for the basic information of expatriates for all research variables.

3.5.2 Purification and Reliability of the Measurement Constructs

To purify the measurement scales of each research construct and to identify their dimensionality, principal components factor analysis with varimax rotation will be applied to condense the collected data from a member of variables into a few factors. After conducting factor analysis, item-to-total correlation and internal consistency analysis will be employed to confirm the reliability of each research factors.

A. Item-to-total Correlation:

Item-to-total correlation will be used to identify the extent of the common core that a variable (item) belongs to the domain of the concept (total).

B. Internal Consistency Analysis

Coefficient alpha (α) will be used to test the internal consistency of each factor. According to Robinson & Shaver (1973), if α is smaller than 0.3, then it implies that the reliability of the factor is too low. This study will adopted Hair et al.'s (2006) comments and set 0.6 as the minimum acceptable level for all coefficient alphas.

3.5.3 Interrelationship between Research Variables

A. Multiple Regressions and Hierarchical Regression Analysis

For a better understanding of the influences of independent variables on dependent variable, multiple regression analysis will be used to verify the effects of independent variables to dependent variable. In addition, hierarchical regression analysis will be used to evaluate the moderating effects of team cohesiveness and knowledge practice on dependent variables.

B. Structure Equation Model

In order to find out the fitness of the whole research model in this study, structure equation model (SEM) will be used. The Amos 5.0 will be used to analyze the relationships in the entire research model to identity the relationship among research variables in this model. Competing models will also be adopted to identify the difference of β coefficients between high and low of team reflexivity and product innovativeness group.

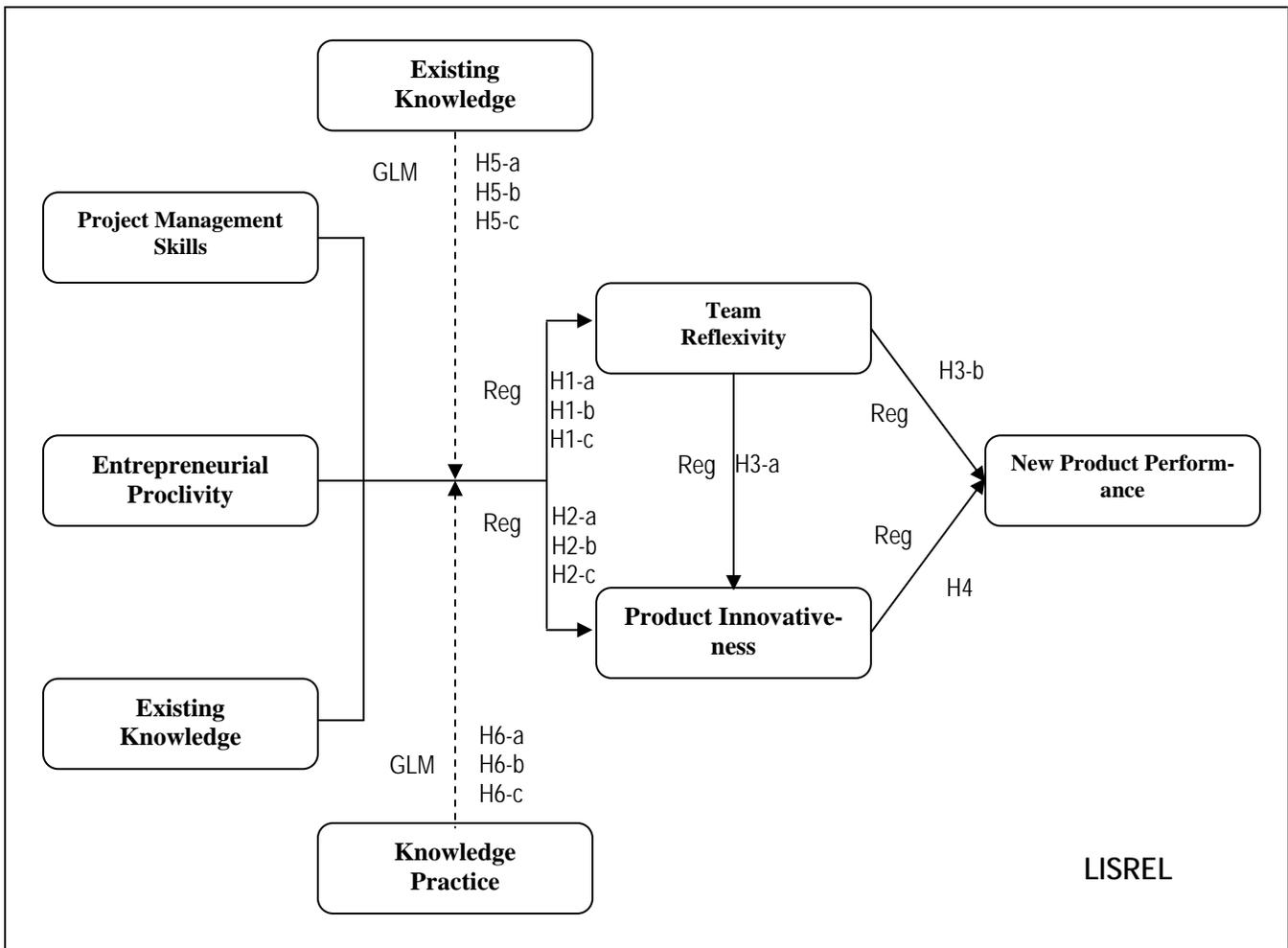


Figure 3. statistical data analysis techniques to be adopted in this study

Note: Reg = Multiple Regression Analysis

GLM = General Linear Model ANOVA

IV. Descriptive Analysis and Research Results

4.1 Characteristics of Respondents

In this study, an on-line questionnaire survey is conducted to 500 R&D team members of NPD team members from three Tainan Science Park. The email address of each respondent is obtained from the human resources department of each high tech company. The survey material includes a cover letter from researcher and university-addressed. They are asked to express their opinions about the influences of the antecedents on team reflexivity and their product innovativeness as well as new product performance. Respondents are also asked to evaluate the influences on reflexivity and knowledge practice. Because of the nature of the data collection (i.e., cold-email, demanding, and lengthy surveys), this study offers a “lucky draw” incentive for a free buffet (for 4 people) at an international five-star hotel in Taiwan.

Out of 500 respondents, 142 completed and returned questionnaires with follow-up e-mail. A total of 132 usable responses were obtained, with a response rate of 26.4%. Table 1 lists the basic characteristics of the sample firms. As shown in Table 1, the information and electrical industry is the majority industries in this study, which was about 34.09%. Approximately 43.18% of the firms’ histories were between 10 to 15 years, 45.45% of the firms had the employee number below 500 and, 43.78% of the

firms' capital was above 150 million USD. Furthermore, upon examination of the ratio of expenditure on research and development and on new product development, more than 74% of the firms were below 2%.

Table 1 Characteristic of Sample Firms

Construct	Classification	Number	Percentage
Industry	Information and Electrical Industry	45	34.09%
	Service Industry	28	21.21%
	Financial Industry	17	12.88%
	Mechanical Industry	12	9.09%
	Retailing Industry	8	6.06%
	Logistic and Transportation Industry	3	2.27%
	Others	19	14.39%
History	0-9 years	70	32.58%
	10-15 years	97	43.18%
	Above 16 years	50	24.24%
Number of employees	Below 500	60	45.45%
	501-1000	45	34.09%
	1001-3000	27	20.45%
	3001-5000	7	5.30%
	Above 5000	15	11.36%
Capital	Below 50 million USD	28	21.66%
	51-149 million USD	44	34.56%
	Above 150 million USD	60	43.78%
Ratio of expenditure on research and development divided by sales	Below 2.0%	98	74.19%
	2.0%-6.0%	30	23.50%
	Above 6.0%	4	2.30%
Ratio of expenditure on new product development divided by sales	Below 2.0%	90	76.04%
	2.0%-6.0%	35	21.66%
	Above 6.0%	7	2.30%

4.2 Factor and Reliability Analysis

This research used principal component factor analysis and the varimax rotated method to extract relevant factors with an eigenvalue of greater than 1. Two essential criteria in terms of the values of factor loadings are that they be greater than 0.5 and the difference of factor loadings between each are larger than 0.3 ensured in the specifications.

In the reliability analysis, the item-to-total correlation must be larger than 0.5. Cronbach's coefficient alpha (α) must be larger than 0.6 (Hair et al., 2006). Table 2 shows the structure of factor loadings, the coefficients of item-to-total correlation, and the coefficients of Cronbach's alpha of each research construct. It is shown that the dimensionality and reliability of the factors for all research constructs are quite reliable and acceptable. Thus, using these constructs, tests of hypotheses were undertaken in the next section to investigate the relationships among research factors.

Table 2 Factor Analysis and Reliability Test

Research Construct	Number of Items	Factor loadings	Item-to-Total Correlation	Cronbach's α
Project management skills	2	0.898-0.898	0.614-0.614	0.761
Entrepreneurial proclivity	6	0.778-0.905	0.682-0.847	0.823
Existing knowledge	4	0.725-0.882	0.522-0.702	0.781
Team reflexivity	5	0.882-0.946	0.830-0.908	0.858
Product innovativeness	4	0.710-0.889	0.523-0.682	0.764
New product performance	5	0.884-0.912	0.810-0.886	0.845
Team cohesiveness	5	0.840-0.920	0.820-0.885	0.848
Knowledge practice	10	0.822-0.910	0.786-0.885	0.821

4.3 Research Analysis and Results

1. The antecedents and *consequences* of NPD team reflexivity and product innovativeness

To verify the influence of project management skills, entrepreneurial proclivity and existing knowledge on team reflexivity and product innovativeness, this study adopt regression analysis. As shown in model M1 and M5 of Table 3, project management skills has a significant effect on team reflexivity ($\beta=0.509$, Adj-R2=0.253, F=39.869, $p<0.000$) and on product innovativeness ($\beta=0.609$, Adj-R2=0.366, F=67.648, $p<0.000$).

Table 3 The Influence of Project Management Skill, Entrepreneurial Proclivity and Existing Knowledge on Team Reflexivity and Product Innovativeness

Independent variable	Dependent variable							
	Team reflexivity				Product innovativeness			
	M1	M2	M3	M4	M5	M6	M7	M8
Project management skills	0.509** *			0.118	0.609** *			0.062
Entrepreneurial proclivity		0.599*		0.369** *		0.737** *		0.584** *
Existing knowledge			0.590** *	0.266*			0.609** *	0.191
R ²	0.259	0.358	0.349	0.438	0.374	0.543	0.371	0.578
Adj-R ²	0.253	0.353	0.343	0.423	0.366	0.539	0.366	0.567
F	39.869	63.626	61.002	29.095	67.648	135.724	67.348	51.204
P	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
D-W	1.748	1.832	1.752	1.738	2.056	2.167	2.056	2.227
VIF	1.000	1.000	1.000	0.549 - 0.787	1.000	1.000	1.000	0.549 - 0.721

In addition, M2 and M6 of Table 2 indicate that entrepreneurial proclivity has a significant effect on team reflexivity ($\beta=0.599$, Adj-R2=0.353, F=63.626, $p<0.000$) and on product innovativeness ($\beta=0.737$, Adj-R2=0.539, F=135.724, $p<0.000$). From M3 and M7 of Table 3, existing knowledge has a significant effect on team reflexivity ($\beta=0.590$, Adj-R2=0.343, F=61.002, $p<0.000$) and on product innovativeness ($\beta=0.609$, Adj-R2=0.366, F=67.348, $p<0.000$). These results seem to suggest that NPD teams with

higher levels of project management skills, entrepreneurial proclivity and existing knowledge tend to promote team reflexivity and product innovativeness.

Furthermore, as shown in M9 to M12 of Table 4, regression analysis is also used to verify the inter-relationship among team reflexivity, product innovativeness and new product performance. M9 of Table 4 suggests that team reflexivity has significant influence on product innovativeness ($\beta=0.572$, Adj-R2=0.321, F=55.329, $p<0.000$), while M11 of Table 4 proposes that product innovativeness has significant influence on NPD performance innovativeness ($\beta=0.815$, Adj-R2=0.661, F=225.658, $p<0.000$). It is also illustrated from M11 of Table 4 that new product performance has been impacted from product innovativeness ($\beta=0.644$, Adj-R2=0.409, F=80.686, $p<0.000$).

The above results seem to indicate that firms intending to improve NPD performance should build up team reflexivity and product innovativeness. Firms should adjust team’s performance strategies in response to changes in the context and the progress of the team project. By enhancing team reflexivity, firms can make sure the uniqueness and newness of the new product with continuously improvement to the product lines. The NPD team should consistently meet technical objectives and develops better products than its competitors in the process of new product development.

Table 4 Team Reflexivity and Product Innovativeness on New Product Performance

Independent variable	Dependent variable			
	Product innovativeness	New product performance		
	M9	M10	M11	M12
Team reflexivity	0.572***	0.644***		0.264***
Product innovativeness			0.815***	0.664***
R ²	0.327	0.414	0.664	0.711
Adj-R ²	0.321	0.409	0.661	0.706
F	55.329	80.686	225.658	139.238
P	0.000	0.000	0.000	0.000
D-W	2.054	1.709	2.064	1.867
VIF	1.000	1.000	1.000	0.673-0.673

2. The influence of team cohesiveness and knowledge practice on team reflexivity and product innovativeness

To evaluate the moderating effects of team cohesiveness for the influence of project management skills on team reflexivity and product innovativeness, a two-way ANOVA is employed. Three treatments are selected in this study. Treatment one is the levels of project management skills; treatment two is the factor score of entrepreneurial proclivity; treatment three is the factor score of existing knowledge. Every treatment is categorized into low and high levels using the mean value of factor score as the cut off point. The dependent variables are the factor score of team reflexivity and product innovativeness.

Figure 2-a, 2-b, 2-c, 2-d, 2-e and 2-f shows the moderating effects of team cohesiveness for the influence of project management skills, entrepreneurial proclivity and existing knowledge on team reflexivity and product innovativeness. It is shown that the levels of NPD team cohesiveness play a critical role for firms to promote team reflexivity and product innovativeness. As shown in Figure 2-a and Figure 2-b, teams with higher levels of cohesiveness and higher levels of project management skills tend to achieve higher levels of team reflexivity (mean= 5.38) and product innovativeness (mean= 5.31), while

teams with lower levels of cohesiveness and lower levels of project management skills tend to have lower levels of team reflexivity (mean= 4.08) and product innovativeness (mean= 3.71). Figure 2-c and Figure 2-d show that NPD teams with higher levels of team cohesiveness and higher levels of entrepreneurial proclivity tend to achieve higher levels of NPD team reflexivity (mean= 5.58) and product innovativeness (mean= 5.46), while NPD teams with lower levels of team cohesiveness and lower levels of entrepreneurial proclivity tend to achieve the lower levels of team reflexivity (mean= 4.13) and product innovativeness (mean= 3.87). In addition, Figure 2-e and Figure 2-f indicate that NPD teams having higher levels of team cohesiveness and adopting higher levels of existing knowledge tend to achieve the higher levels of NPD team reflexivity (mean= 5.35) and product innovativeness (mean= 5.24), while NPD teams with lower levels of team cohesiveness and adopting lower levels of existing knowledge tend to achieve lower levels of team reflexivity (mean= 4.10) and product innovativeness (mean= 3.82). It is suggested that the interactions between project management skills, entrepreneurial proclivity and existing knowledge, and team cohesiveness have provided catalytic effects on NPD teams to promote team reflexivity and product innovativeness.

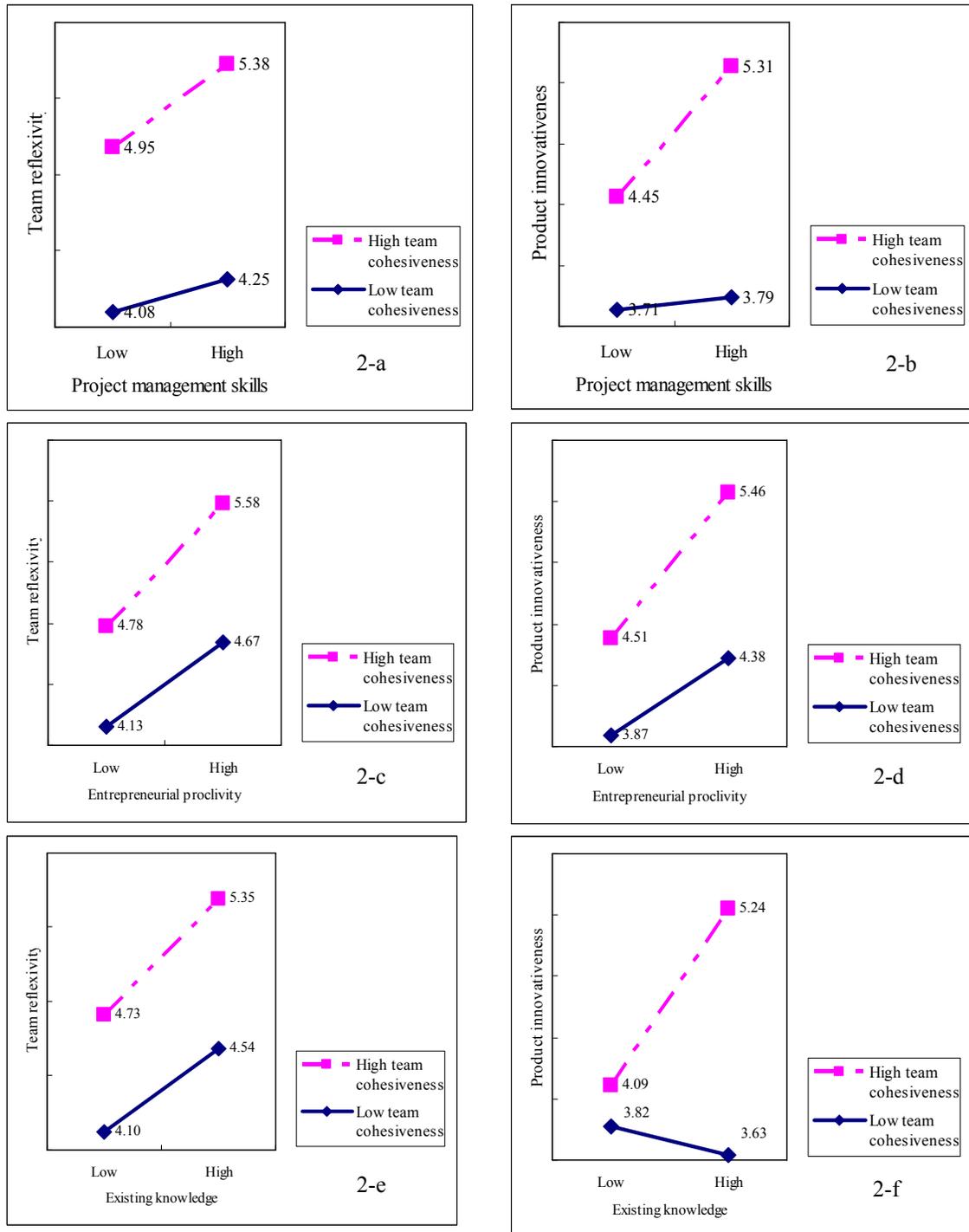


Figure 4. The moderating effect of team cohesiveness

With the same categorization method, Figure 3-a to Figure 3-f point out that knowledge practice has moderating effects on team reflexivity and product innovativeness. Figure 3-a and Figure 3-b propose that NPD teams adopting higher levels of knowledge practice and higher levels of project management skills tend to achieve the highest level of NPD team reflexivity (mean= 5.28) and product innovativeness (mean= 5.09). Figure 3-c and Figure 3-d show that NPD teams with higher levels of knowl-

edge practice and entrepreneurial proclivity tend to achieve higher levels of NPD team reflexivity (mean= 5.49) and product innovativeness (mean= 5.35). Figure 3-e and Figure 3-f suggest that NPD teams with higher levels of knowledge practice and exercise higher levels of existing knowledge tend to achieve higher levels of team reflexivity (mean= 5.24) and product innovativeness (mean= 5.05). These results seem to suggest that if NPD teams try to exercise higher levels of project management skills, entrepreneurial proclivity and existing knowledge and simultaneously emphasize knowledge practice, then they could achieve significantly higher levels of team reflexivity and product innovativeness.

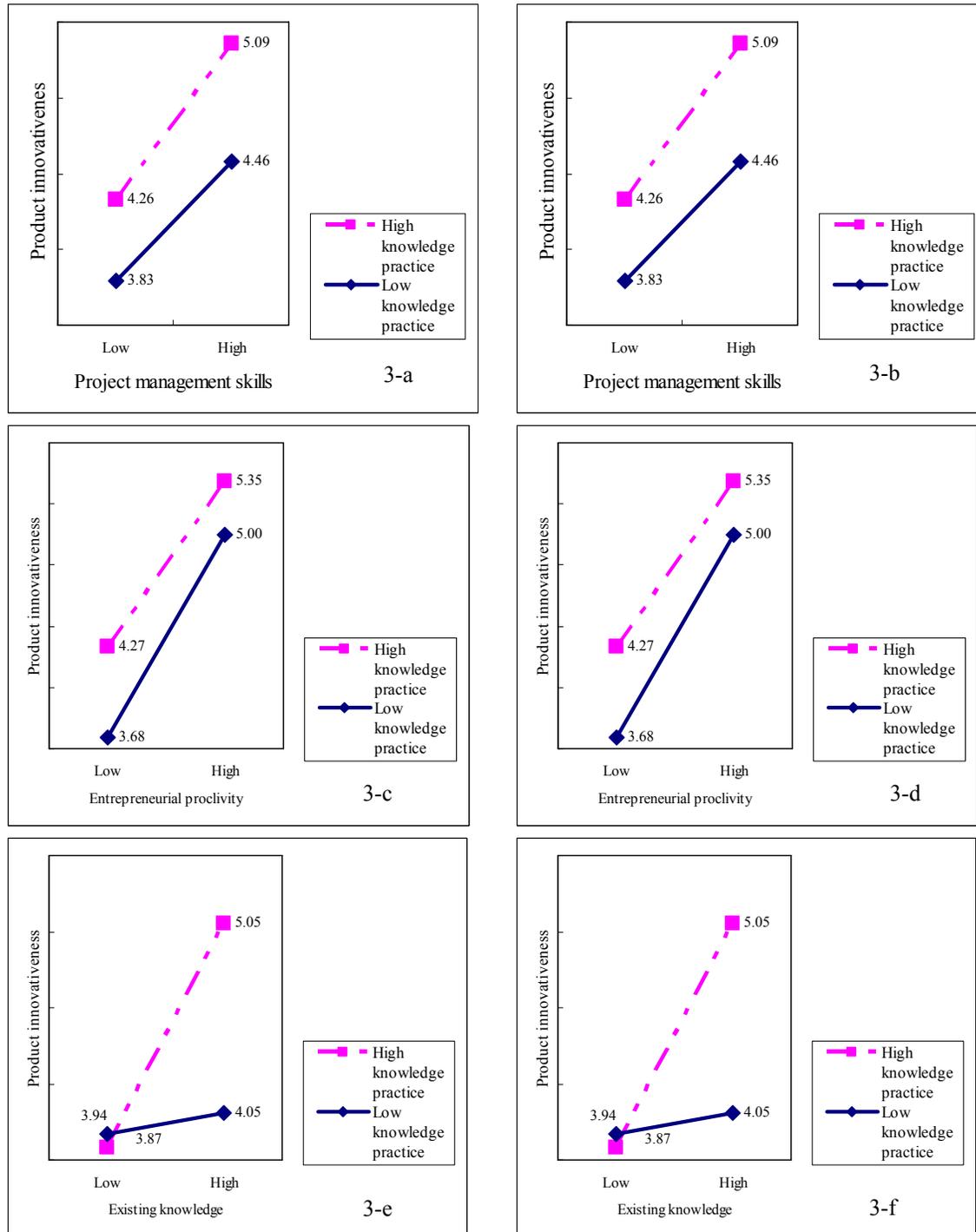


Figure 5. The moderating effect of knowledge practice

V. Conclusion and Suggestion

The primary aim of the current study is to emphasize the success of new product development on the NPD team level, by determining the effects of team's existing knowledge and project management skills as well as entrepreneurial proclivity on team reflexivity, product innovativeness and NPD performance. Moreover, the moderating effects of team cohesiveness and knowledge practice for the influences of the above three antecedents on team reflexivity and product innovativeness are also evaluated. Although plenty of previous studies have emphasized the influential factors for NPD performance, rare studies focus on the antecedents and consequences of NPD team reflexivity. Through a comprehensive literature review on NPD team reflexivity and performance, this study develops a comprehensive research model that encompassed the antecedents and consequences of team reflexivity on NPD teams. The three antecedents are project management skills, entrepreneurial proclivity and existing knowledge; while the two consequential variables are product innovativeness and NPD performance. Project management skills and existing knowledge which reflects on tacit knowledge of teams; whereas entrepreneurial proclivity represents the eagerness of NPD team members to acquire and disperse their tacit knowledge to other team members. These three antecedents are served as critical factors to enhance the level of team reflexivity. The research further proposed that the cohesiveness level of NPD team and the way knowledge practice (either as community or collectivity) moderate the influence of three antecedents on team reflexivity and product innovativeness level.

Several conclusions could be drawn for the results of this study. First, project management skills, entrepreneurial proclivity and existing knowledge have significant impact on NPD team reflexivity. Therefore, it is important to build up project management skills among team members. These project management skills can be created through intensive training, social interaction among NPD members and professional development activities. The above conclusion is in line with previous studies. Hoegl and Parboteeah (2006) argue that while team reflexivity is positively related to team effectiveness and efficiency, social skills and project management skills are important determinants of team reflexivity. Project management skills are necessary for flexible planning and ongoing controlling of the task process, which is of particular importance in the case of innovative projects, given their high degree of task-related uncertainty and complexity. When teams were unable to recognize and reconcile their different perspectives, they were unable to be successful. Additionally, failure rate in new product development remains high because organizations fail to learn from their past successes and mistakes. NPD teams that have the skills to properly structure and control their task processes will likely demonstrate higher levels of team reflexivity, scanning internal and external environments for feedback based on proper information regarding current task status, routinely re-evaluate chosen task strategies and are prepared to alter them if the situation calls for such action.

An entrepreneurial proclivity promotes initiative as what Birkinshaw (1997) called "dispersed entrepreneurship", which is the involvement of multiple management levels in the formulation and implementation of entrepreneurial strategies. Entrepreneurial proclivity is not created or imposed by the top management, but reflects the strategic posture as exhibited by multiple layers of management (Stevenson & Jarillo, 1990). When the organization has higher entrepreneurial proclivity, the members and managers as well as owners has willingness to be more proactive to adapt to the dynamic change of the external environment. Existing knowledge has been recognized as an essential component of organizational learning; the depth and breadth of an existing knowledge base determines how easily new information is incorporated. Thus, existing knowledge influences the extents to which new knowledge is created, and the new knowledge that is formed is converted to existing knowledge in the form of new products and services (Smith, Collins, and Clark, 2005).

Second, project management skills, entrepreneurial proclivity and existing knowledge have signifi-

cant impact on product innovativeness. Therefore, in order to organize NPD teams to work simultaneously without gaps and overlaps, project management skills are necessary to implement an innovative NPD project. In addition, entrepreneurial proclivity is also required because an innovative NPD project require team members to engage in propensity to act proactively and to take a great deal of risk when confront with market opportunities (Sethi et al., 2001). Furthermore, the application of existing knowledge which holds by NPD team members are also important for product innovativeness, because the behavioral routines will direct NPD teams to be more innovative and effective. Third, NPD team reflexivity has positive influences on product innovativeness and NPD performance. Product innovativeness also has positive influences or NPD performance. As suggested by West (2002) and Tjosvold et al. (2004), reflex teams are more likely to make better use of expertise and skills of team members, which will eventually achieve better NPD project success. In addition, team reflexivity is very helpful as the innovative NPD teams normally are facing very high tension of unpredictability. The team reflexivity can foster the ongoing collection and sharing of information which is very critical to the success of NPD (Scotte and Langley, 2000).

Finally, both NPD team cohesiveness and knowledge practice play a critical moderating role for the influences of project management skills, entrepreneurial proclivity and existing knowledge on team reflexivity and product innovativeness.

Based on Wang et al. (2006), team cohesiveness is built partly through the willingness of members to participate and commitment to learn the new style. Group cohesiveness is proved to be positively related to meet management goals. Thus resource within an organization should support the climate of the building of team cohesiveness. In addition, Lindkvist (2005) suggests that the practices of community knowledge can create a “tightly-knit” relationship with a cohesive mutual and share understandings. Such mortality and unstinting can significantly impact on team reflexivity, product innovativeness and PND performance.

Several suggestions could be made for academic and business practitioners. First, how to create NPD team reflexivity is the key issue for product innovativeness and NPD performance. Second, to promote team reflexivity in the dynamic NPD process, recruiting qualified NPD team members with good skills in project management and entrepreneurial proclivity that can apply their existing knowledge in the NPD process is extremely essential. Third, the cohesiveness and knowledge practices of NPD teams play a key role that can moderate the influences of project management skills, entrepreneurial proclivity and existing knowledge on product innovativeness and NPD performance. R&D managers should be aware of their situation and manipulate such an organizational climate for NPD.

Although these research results are compelling, several limitations exist in this study. These limitations suggest areas and directions for further research. The cross-sectional research design, the composition of the sample, and the response rates all serve to temper the results of this study. First, as this study adopts the cross-sectional research design which examines executive’s opinions at one point in time, the directional relationships as shown in the study results should be inferred with high caution. Future longitudinal research is suggested to confirm the results of the cross-sectional research.

Second, as the respondents of this study only consist of NPD team members of the science park in Taiwan, the generalizability of the study results should be limited to these groups of population. Future studies could use the same questionnaire or the questionnaire in an abbreviated form to conduct surveys for other enterprise in different part of the world to confirm the validity and generalizability of these findings. Finally, through it is not unusual for similar surveys to have a response rate lower than 25%, the response rate for this study should be considered as relatively low. Thus, the issues of non-response bias needs to be further evaluated.

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出席國際學術會議心得報告

計畫編號	NSC 96-2416-H-168 -007 -
計畫名稱	新產品知識實務對於團隊凝聚力及新產品開發績效之影響研究。 The Moderating Effects of Knowledge Practice and Team Cohesiveness on NPD Performance.
出國人員姓名 服務機關及職稱	李天祥 博士 崑山科技大學 國際貿易系
會議時間地點	民國97年7月24日(四)至7月26日(六) 美國加拿大，多倫多， Doubletree International Plaza Hotel, 655 Dixon Road, Toronto
會議名稱	(中文) 2008 ACME國際學術研討會 (英文) Association for Chinese Management Educators "ACME" XVIII Annual Meeting
發表論文題目	(中文) 團隊反應力對產品創新的影響：冒險行為的中介效果 (英文) The effect of team reflexivity on the product innovativeness : The moderating effect of risk-taking.

一、參加會議經過

本人前往加拿大多倫多參加華人管理教育者協會 (Association of Chinese Management Educators) 之年會暨論文發表會並擔任 ACME Director & Program Committee，隨即與 Program Chair 李暉，理事會理事陳國蘭博士、吳教授萬益及前任資深理事長 K.C.Chang 及 Otto Chang 等人討論 ACME 今年之籌辦經過及未來之可能發展。大家對於 ACME 未來之發展均有非常多的期待。

此次之報到是由 Program Chair 李暉博士之助理及 Vice President 周行一博士之助理共同負責。首先由本人及其他五位曾擔任副校長及管理學院院長報告各管理學院之經營特色及各學院推動國際化之概況，接著發表論文，此次共分為 30 個場次，每個場次有 5 個 concurrent section 發表論文，約計有 100 位左右之學者參加。會中由 Program Chair Dr.李暉報告 2008ACME 大會籌備狀況，此次會議共有 102 篇論文發表，區分為以下主題：

- accounting
- marketing
- organizational and consumer behavior
- human resource management and general management
- collaborative commerce
- operations management
- e-commerce
- finance
- customer relationship management
- information technology & knowledge management
- accounting-ii & investment
- supply chain management
- healthcare management
- technology mmanagement
- statistics & economics
- production technology & industrial management

- information security & ethics
- business policy & strategy
- hotel and tourism management
- m-commerce and web applications
- enterprise systems
- e-learning & business education
- dss and database technology
- production technology & industrial management

會中邀請美國品質協會(American Society for Quality) 之 Fellow Mr. Larry R. Smith 擔任 Keynote Speaker。成功大學吳教授萬益與中原大學胡為善副校長、加州州立大學 Otto Chang 院長、輔仁大學楊明顯院長、明志科技大學 Cherng-Min Ma 院長及加拿大 Windsor 大學 Diana Kao 副院長等人共同參與 Dean's Panel，討論各管理學院之經營概況及管院未來國際化之展望。

7 月 24 日下午 6:30 在 Double Tree Hotel 舉行 2008ACME 大會晚宴，晚宴中李暉博士被任命為 2009 年之 ACME President，Diana Kao 被任命為 2009 President elect 及 2010 ACME 之 President，Jerry Chiang 為 VP Publication 及 2011ACME President。這些人選能夠順利地產生代表 ACME 將在新的領導帶領之下邁向新的里程。

7 月 25 日上午首先由擔任管理學院院長報告各學院之經營特色，接著進行 concurrent section 論文發表，每個場次有 5 個 concurrent section 發表論文，本人首先在 10:30-12:00 發表論文，論文題目為「The effect of team reflexivity on the product innovativeness : The moderating effect of risk-taking.」。此論文主要是探討團隊反應力對產品創新的影響，論文發表後得到許多回饋，本人在會中針對學者所提出的問題均予以適當的回答並藉此次機會與多位旅美學者洽談合作研究事宜。論文發表之後進行此次大會之閉幕，並於會中頒獎給協助此次大會有功人員，圓滿閉幕。

二、與會心得

整體而言，觀看此次參加 2008 年 ACME 會議，北美地區之華人學者之研究，整體表現的相當好，若本校相關系所之教師若能與北美地區相關領域之學者建立合作關係則必能達到相輔相成之效果。