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The Synergy of Intrinsic and Extrinsic Motivation on NPD Project Success : Case Study Approach of Technology-Intensive Firms

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Abstract

The object of this research is to explore how motivation (intrinsic and extrinsic) works synergistically in the new product development (NPD) project team proceeding through three project stages (i.e., beginning, ongoing and finishing). Recently, scholars have found the synergistic roles of intrinsic and extrinsic motivation that work on new product development (NPD) projects particularly in the context of technology-intensive firms (TIFs). However, both types of motivation can appear in a temporary state that needs to motivate a project team continuously over long periods of project time. Based on Amabile (1993)'s motivation synergy theory, three illustrative case studies in TIFs provide the roles of motivation synergy (i.e., intrinsic and extrinsic) of a project team for each project stage. This research contributes to the literature of technology management, particularly in human resource management practices to enhance a project team's synergistic motivation through a three-stage project to ensure the desired NPD project performance. Finally, this research proposes a set of propositions. Implications are discussed.

Keywords : Motivation Synergy, Intrinsic Motivation, Extrinsic Motivation, New Product Development, Technology-Intensive Firms

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การฝึกแรงจูงใจภายในและภายนอกเพื่อส่งเสริม ความสำเร็จโครงการพัฒนาผลิตภัณฑ์ใหม่ การวิจัยด้วยกรณีศึกษาบริษัทที่มุ่งเน้นเทคโนโลยี

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บทคัดย่อ

วัตถุประสงค์งานวิจัยนี้ เพื่อค้นหาลักษณะการฝึกแรงจูงใจภายในและภายนอกของทีมพัฒนาผลิตภัณฑ์ใหม่ให้คงอยู่ตลอดช่วงการดำเนินโครงการตั้งแต่ระยะเริ่มต้น ระหว่างดำเนินงานและสิ้นสุดโครงการ ปัจจุบันนี้นักวิชาการพบว่าการฝึกแรงจูงใจภายในและภายนอกมีความสำคัญมากสำหรับทีมพัฒนาผลิตภัณฑ์ใหม่ โดยเฉพาะอย่างยิ่งในบริบทของบริษัทที่มุ่งเน้นเทคโนโลยี ในขณะที่แรงจูงใจทั้งสองประเภทเป็นสภาวะทางอารมณ์ซึ่งอยู่เพียงชั่วคราวเท่านั้น จำเป็นต้องสร้างแรงจูงใจอย่างต่อเนื่องตลอดช่วงโครงการจนกระทั่งสิ้นสุด งานวิจัยด้วยกรณีศึกษานี้ใช้พื้นฐานทฤษฎีการฝึกแรงจูงใจของ Amabile (1993) เพื่ออธิบายบทบาทการฝึกแรงจูงใจภายในและภายนอกของทีมในแต่ละช่วงจนโครงการประสบผลสำเร็จ ประโยชน์งานวิจัยนี้ส่งผลต่อวรรณกรรมด้านการจัดการเทคโนโลยี โดยเฉพาะอย่างยิ่งแนวการปฏิบัติด้านการจัดการทรัพยากรมนุษย์เพื่อส่งเสริมการฝึกแรงจูงใจของทีมเพื่อให้โครงการประสบผลสำเร็จตามต้องการ และผลงานวิจัยนี้นำเสนอสมมติฐานเพื่อการศึกษาครั้งต่อไปและอภิปรายผลในทางปฏิบัติ

คำสำคัญ: การฝึกแรงจูงใจ, แรงจูงใจภายใน, แรงจูงใจภายนอก, การพัฒนาผลิตภัณฑ์ใหม่, บริษัทที่มุ่งเน้นเทคโนโลยี

1. Introduction

The iron triangle of time, cost and quality for project completion is widely recognized as the key indicator of project success (PMI, 2008). More specifically under the increasing complex environment in technology-intensive firms (TIFs), new product development (NPD) projects have required a substantial commitment of company resources to ensure advances in technology through timely new products to the marketplace (Collins and Smith, 2006; Makri et al., 2006). Many studies found that NPD success depends not only on the project team's capability, but also on their intrinsic and extrinsic motivation to work in the high-velocity TIF environment (e.g., Dewett, 2007; Popaitoon and Popaitoon, 2016; Schmid and Adams, 2008). Moreover, Zhao and Chadwick (2014) point that project team's motivation for NPD success is more important than their NPD capability in determining TIFs' innovation performance, since the NPD team involves an extremely collective effort under work pressures for driving creativity and innovation. Hence, this research aims to study a project team's motivation for NPD success in TIFs.

In the literature, Deci (1975) has categorized work motivation into two types: that of extrinsic and intrinsic motivation. Extrinsic motivation results from financial rewards and incentives (external) that organizations use in a price system to stimulate knowledge sharing by linking employees' monetary motives to the goal of the firm. In contrast, intrinsic motivation refers to the motivational state in which an individual is attracted to their work or committed to the work itself, which motivation is not due to any external outcomes.

Amabile (1993) argues that both types of extrinsic and intrinsic motivation can have very important effects on the different ways to ensure the quality of work performance, particularly in relationship to innovation contexts. For example, in the context of NPD in TIFs, many studies have found that a project team's intrinsic motivation is significant for transferring best practices and for fostering a creativity climate (e.g., Dewett, 2007). Further, extrinsic motivation also plays a trigger role in the speed of project management (e.g., Popaitoon and Siengthai, 2014). As such, Amabile (1993) has proposed a model of motivational synergy that emphasizes the ways in which intrinsic motivation might interact with extrinsic motivation so that both types can combine synergistically in the two important roles of extrinsics in service of intrinsics and the motivation-work cycle match.

The role of extrinsics in service of intrinsics is supported by many empirical studies (e.g., Cerasoli et al., 2014; Makri et al., 2006; Popaitoon and Popaitoon, 2016). For example, based on sample of 198 NPD projects in MNC automobiles in Thailand, Popaitoon and Popaitoon (2016) found that intrinsic motivation could directly influence NPD projects for the short- and long-term performance, and that the impact of intrinsic motivation on these project outcomes could be improved on the condition that employees perceived extrinsic rewards. However, *how the motivation-work cycle match* (i.e., intrinsic and extrinsic) synergistically works during the project stages (i.e., beginning, ongoing and finishing) is still unclear. This also reflects on recent calls for research on motivation during each project stage, since both types of motivation appear in a

temporary state that need to continuously motivate a project team over long periods of project time (Amabile and Pratt, 2016; Popaitoon and Popaitoon, 2016; Zhao and Chadwich, 2014).

Accordingly, this research attempts to answer the research question of “What and how does motivation (extrinsic and intrinsic) synergistically work for the three project stages (i.e., beginning, ongoing, finishing)?” To answer this question, this research uses the case study method based on three selected case studies in TIFs. Given these findings, this research contributes to the literature of technology management by (1) applying the theory of motivational synergy (Amabile, 1993) based on case study research in the real context (Amabile and Pratt, 2016), (2) exploring the synergistic role of intrinsic and extrinsic motivation to enhance the NPD project success in the context of TIFs (e.g., Keegan et al., 2018; Popaitoon and Popaitoon, 2016), and (3) providing a set of propositions. This paper is structured as follows. The next section reviews the literature and develops the specific research question. After outlining the research methodology, I describe and discuss the empirical findings based on the three selected case studies. Finally, the paper concludes by providing a set of propositions and implications.

2. Literature Review

2.1. *New product development projects in technology-intensive firms*

Technology-intensive firms refer to companies that emphasize invention and innovation in their business strategy, deploy a significant percentage of their financial resources to research and development

(R&D) and use advanced technology to develop new products in a timely manner to the market (adapt from Marki et al., 2006). Wheelwright and Clark (1992) point out that the competitiveness of TIFs, particularly in the automobile industry, depends ultimately on the success of their NPD projects. This is not only for improving market position, but also for creating new industry standards. Based on the context of the study, multinational company (MNC) in Thai automotive industry is viewed as TIFs, since multinational companies are constantly commissioning new product R&D projects to ensure advances in technology through the introduction of timely new products to the marketplace (BOI, 2016). Recently MNC automobiles in Thailand have faced challenging issues such as international standardization, intensive international competition, and global shortages of energy. These challenges have urged MNCs to prepare for their future development in terms of adjusting technology to promote advances such as green production, energy-saving nanotechnology and biotechnologies, and developing best practices. Porter (1986) has identified MNC as a network of product, capital, and knowledge flows adapted from global strategies into local subsidiaries. Accordingly, MNC headquarters need to transfer these types of knowledge to their local subsidiaries in line with their international policy (e.g., global standards and advanced technologies). In other words, the outcomes of knowledge transfer from MNC headquarters have been materialized in terms of new products through product development projects in their local subsidiaries (Gupta and Govindarajan, 2000). This study investigates the NPD project of MNC automobiles in Thailand, which

reflects on the outcomes of knowledge transfer from the headquarters.

In the literature, Wheelwright and Clark (1992: 73) divide the nature of NPD projects in the automotive industry into three types; namely, breakthrough, platform and derivative projects. Breakthrough projects of product development involve significant changes to existing products and processes incorporating revolutionary new technologies or materials. Successful breakthrough projects establish core products and processes that differ fundamentally from previous models or generations. On the other hand, *derivative projects* range from cost-reduced versions of existing products to enhance an existing production process. For *platform projects*, they are in the development spectrum between breakthrough and derivative projects that entail the change of some products or processes. This study focuses on the breakthrough NPD projects, particularly as to the outcome of knowledge transfer assignment from the MNC headquarters (e.g., new technology implementation) to the local subsidiaries. Based on Amabile and Pratt (2016) and Clark et al (1987) as to application, the project is divided into three stages; namely the beginning, ongoing and finishing. First, the *beginning* stage starts from receiving the project assignment from the headquarters to the project planning. This stage involves identifying project team members and clarifying the goals and responsibilities. The project goals attain not only technical goals but also marketability goals. Second, the *ongoing* stage involves implementing and testing the ideas of project planning. This stage requires supporting resources for the assignment and skills in innovation management

and creativity for solving problems and providing best solutions. Third, the *finishing* stage involves outcome assessment. This stage provides feedback for success or failure. Amabile and Pratt (2016) point out that the projects such as R&D and breakthrough NPD projects require not only high levels of a project team's motivation for creativity and innovation, but also a complex set of activities involving many people over long periods to ensure project success.

Amabile and Pratt (2016, p.160) explain the model of creativity and innovation in an organization in which the individual/team and the organizational components interact to produce something new such as new products/ processes in which the model assumption is inextricably linked between individual creativity and organizational innovation. Specifically, the creativity of individuals and teams provide innovation within the organization. Hence, without creative ideas, there is nothing to implement. Amabile and Pratt (2016) point out that three important components to support individual/team creativity for enhancing organization innovation are composed of: (a) motivation to do the assignment, (b) skills in the assignment domain, and (c) creativity-relevant processes and skills in innovation management. Moreover, scholars emphasize that the key driver to accomplishing the related innovation assignment is intrinsic motivation, and complementary through extrinsic rewards that work in the service of intrinsics (e.g., Amabile and Pratt, 2016; Popaitoon and Popaitoon, 2016; Zhao and Chadwick, 2014). Accordingly, this research focuses on a project team's motivation (i.e., intrinsic and extrinsic) during the three-stage project for NPD project success in TIFs.

2.2. Motivation synergy

Deci (1975) has divided human motivation toward work into two types that are extrinsic and intrinsic motivation. People can be intrinsically motivated toward a task by their interests, enjoyment, satisfaction, and challenge of the activity itself. Scholars such as Amabile (1993) and Dewett (2007) point out that intrinsic motivation is crucial for a project team's creativity and innovation particularly in the context of high-velocity TIF environments. In the literature, intrinsically motivated individuals tend to be cognitively more flexible, to prefer complexity and novelty, and to seek higher levels of challenge and mastery experience. These types of individuals are more likely to be persistent in finding possible alternatives to solve a problem (e.g., Dewett, 2007; Osterloh and Frey, 2000). In contrast, extrinsic motivation requires instrumentality from externals such as financial rewards, incentives, or verbal rewards where organizations use a price or tangible system to stimulate employees' motives to accomplish the goals of the firm. For example, incentives are used to trigger the speed of learning and project management for extrinsically motivated individuals to complete the project in limited time (e.g., Gupta and Govindarajan, 2000; Popaitoon and Siengthai, 2014). Moreover, Kessler and Chakrabarti (1996) emphasize team-based rewards can not only encourage cross-functional cooperation but also reduce the potential for conflict within work groups that emphasize common group outcomes such as project team accomplishments (Darawong, 2017).

While both types of motivation are thought to be crucial for NPD project success, previous studies on the effects of both kinds of motivation on related NPD

success found the mixing results (Osterloh and Frey, 2000; Popaitoon and Rayton, 2012). Based on the crowding theory of human motivation (Frey, 1997; Osterloh and Frey, 2000), extrinsic rewards can undermine the facilitative effects of intrinsic motivation on performance (e.g., Lin, 2007; Schmid and Adams, 2008). However, Amabile and Pratt (2016) argue that the adverse effects of the extrinsic motivators occur since employees may perceive of the organization as controlling. Deci and Ryan (1985)'s study explains extrinsic motivators in cognitive evaluation theory as "informational" to confirm the value of their competencies versus "controlling" to lead people by an external force. Amabile and Pratt (2016) point out that those informational motivators are more supportive of intrinsic motivation than controlling ones, particularly if the meanings people attach to extrinsic motivators are for rewards that are presented as recognition for a job well done. This echoes Amabile (1993)'s motivation synergy theory in a modification of the previous psychological view that extrinsic motivation undermines intrinsic motivation. Amabile (1993: p.185) proposes that certain types of extrinsic motivation can combine synergistically with intrinsic motivation, particularly when initial levels of intrinsic motivation are high. Such synergistic motivational combinations should lead to high levels of employee satisfaction and performance. Two mechanisms are proposed for these combinations: *extrinsics in service of intrinsics*, and *the motivation-work cycle match*.

Based on Amabile (1993)'s motivation synergy theory, a number of empirical studies support this notion (e.g., Baer, 2012; Cerasoli et al., 2014; Popaitoon and Popaitoon, 2016; Shaw and Gupta, 2015). For example,

Cerasoli et al. (2014)'s meta-analysis concluded that intrinsic motivation and extrinsic rewards jointly predict performance, and are not necessarily antagonistic. Likewise, Shaw and Gupta (2015) show strong evidences that financial incentives do not reduce intrinsic motivation as previous studied, but the evidence suggests that people feel more autonomy when they are paid for performance. Consistently, Popaitoon and Popaitoon (2016) find that the synergistic role of intrinsic and extrinsic work motivation on NPD project performance in the TIF environment is based on a sample of 198 projects in MNC automobiles in Thailand. The results reveal that intrinsic motivation could directly influence NPD projects for the short-and long-term performance, and that the impact of intrinsic motivation on these project outcomes could be improved on the condition that employees perceived extrinsic rewards to be high. Further, the diminished impact will be observed when employees have perceived extrinsic rewards to be low. However, previous empirical studies support the role of extrinsics in services of intrinsics to the NPD project success; and, it is still rudimentary as to how the motivation-work cycle matches. Since both types of motivation can appear in a temporary state that need to motivate a project team continuously over long periods of project time, it supports recent calls for research on motivation during each project stage such as in the studies of Popaitoon and Popaitoon (2016), Schmid and Adams (2008) and Zhao and Chadwich (2014). Taken together, this leads to a specific question:

Research question: What and how does motivation (extrinsic and intrinsic) synergistically work during the three project stages (i.e., the beginning,

ongoing, and finishing)?

2.3. Motivation synergy in the three-stage NPD project

To answer the research question, this study uses Amabile (1993)'s motivation synergy theory to explain the phenomena based on three selected case studies that are explained in the following section. Amabile (1993) has explained that the roles of intrinsic and extrinsic motivators are not completely separate systems, and do not undermine each other. Moreover, Amabile (1993) propose two mechanisms for these combinations: extrinsics in service of intrinsics, and the motivation-work cycle match.

At the beginning stage of an NPD project, intrinsic motivation is the most importance in that an NPD project team is deeply involved in the work they do because the assignment is interesting and challenging to them. In addition, this degree of intrinsic motivation may be impervious to the undermining effects of extrinsic motivators. It can be expected that there are additive effects of intrinsic and extrinsic motivation when intrinsic motivation toward the work is already strong and salient. However, Amabile (1993) points out that these positive effects should not be expected with all types of extrinsic motivation. It appears that certain types of reward, recognition, external control, and feedback that confirm competence as well as the feedback might provide important information as to improve competences which should have such effects. Intrinsic motivation is essential for novelty at the initial stage and creative process. During the ongoing stage of an NPD project, however, it may be less important that extrinsic motivation plays important roles to facilitate the work of a project team (Amabile, 1993; Amabile

and Pratt, 2016). Extrinsic motivators work in the service of intrinsic by providing information about a project team's competence, and by enhancing project team's autonomy and involvement in intrinsically interesting assignments. A combination of intrinsic motivation and appropriately-timed synergistic extrinsic motivation may lead a project team's work-involving complex, ongoing projects to the highest levels of creative and productive work. For the finishing stage, it is the outcome of the NPD project success, as to whether the project is stopped or attempted again. Amabile and Pratt (2016) point out that feedback at this stage should provide the outcome of their motivation. In the case that a project team would return to the first stage for iteration through the process, their intrinsic motivation would increase. Consistently, Amabile (1993) remarks that work performance will depend on the extent to which the motivators available in the work environment (both intrinsic and extrinsic) match the individual's basic motivational orientation toward work. Specifically, a high level of novelty in the output requires a high degree of intrinsic motivation. In addition, it also depends on a project team's skill and contextual factors.

3. Methods

This research employed case study research that is a research strategy and an empirical inquiry that investigates a phenomenon within its real-life context (Yin, 2013). Yin (2013) suggest that researchers should use a qualitative research design, in particular, a case method when they need to address on the "how and why" of the phenomenon and to have an in-depth understanding on the local context. This

approach to research is therefore useful for this study which focuses on the psychological aspects of the relationship between a project team's motivation and NPD project success. In particular, the in-depth interviews are aimed at: (1) exploring practically how project managers applied these types of motivation (intrinsic and extrinsic) to support the achievement of NPD project performance; (2) explicating why intrinsic motivation outweighs extrinsic motivation in the study context based on the literature; and (3) demonstrating how the extrinsic motivation works in the service of intrinsic motivation. This research conducts a qualitative multiple case study methodology (as shown in the following section), including semi-structured face-to-face interviews, review of industry publications, and participation in site visits (Yin, 2013).

3.1. Case selection

Based on the research objective, the case study companies were selected, based on the following criteria: (a) being MNC automobiles that particularly transfer their knowledge from headquarters to local projects for implementing NPD projects; (b) showing a high rate of high-tech new product series that are viewed as TIFs; (c) conducting R&D hubs in Thailand to develop new products; and (d) completing their breakthrough product development projects-project success as the criteria of their breakthrough project assignments. These four characteristics were important in ensuring that the three selected cases had eliminated potential confusion stemming from other variations in firm characteristics as shown below. Accordingly, this research has chosen selected cases from major

foreign automotive assemblers² which conduct R&D hubs particularly breakthrough NPD projects in Thailand (TAMA, 2018).

3.1.1. Case A (Japanese automobiles in Thailand)

Case A has grown from its origins in Japan during the 1930s to become a large multinational corporation. Today Case A has become the world's third largest automobile maker for the year 2016. The world headquarters of Case A are located in its home country of Japan. Case A has introduced new technologies, including one of the first mass-produced hybrid gasoline-electric vehicles, of which it says it has sold two million units globally as of 2015; with an advanced parking guidance system (automatic parking); a four-speed, electronically-controlled, automatic transmission with buttons for power and economy shifting; and an eight-speed automatic transmission. It has significant market shares in several fast-growing Southeast Asian countries. Case A has run its assembly and four factories in Thailand as a region hub in Asia.

3.1.2. Case B (Japanese motorcycles in Thailand)

Case B started its motorcycle business operations in Thailand in 1964, in response to a rising demand for motorcycles and incentives from the Thai government in promoting the domestic automotive industry. In 1997, Thailand suffered its most severe financial crisis ever. The strong depreciation of the Thai baht caused the debt of Case B to sky rocket. As part of a debt

restructuring agreement in 1998, Case B became the majority stockholder by June 2001, turning it into a wholly Japanese-owned company under a new name. Soon after the acquisition, a localization policy was announced via the mutual consensus of the Japanese and Thai management teams. Since the inception of Case B, the localization process of case B has been an integral part that has fundamentally transformed the company into a profitable, reputable, and sustainable organization.

3.1.3. Case C (US automobile in Thailand)

Case C is a global automotive company based in Michigan USA. Case C is aggressively pursuing emerging opportunities through the company's plan to be a leader in connectivity, mobility, autonomous vehicles, the customer experience, and data and analytics. Case C in Thailand includes several business functions that support selected activities in the region, as well as all sales and marketing activities in Thailand to provide an outstanding customer and ownership experience. Case C established its ASEAN regional headquarters in Bangkok in 2003, from where it manages the production, distribution, sales and servicing of US-brand vehicles for all ASEAN markets. In 2010, with its Thailand operations leading the way, Case C began a product-led transformation of its business across the ASEAN region. Since 2011, Case C has been one of the fastest growing automotive brands in Thailand,

²Based on TAMA (2018), MNC automobiles in Thailand are made up of two main groups (i.e., automotive assemblers and the first tier. Automotive assembler setting comprises 23 MNCs (i.e., 16 car makers and 7 motorcycle makers) and they conduct regional R&D hubs in Thailand. For automotive parts-and-accessories settling, it is so-called the first-tier industry (approximately 615 companies). To ensure this research criteria, this research has chosen the cases from foreign automotive assemblers.

outpacing overall industry sales and gaining market share. This progress is being driven by the segment-defining pickup truck, the recently launched premium SUV, and an EcoSport compact SUV. In 2012, Case C was established as a volume-production and export hub in the region which has underscored Case C's long-term commitment to Thailand. Case C is also continually upgrading the skills of sales teams and technicians through progressive training programs, introducing additional services and technologies, and upgrading its nationwide dealer management system.

3.2 Data sources and analysis

The main source of empirical case study data was senior project/product manager(s), who have been directly involved in managing breakthrough projects and have served as the key contributors to the breakthrough NPD project success. Therefore, they are considered experts in the study context as shown the details of table 1.

Table 1 Description of the selected case studies and key informants

	Case A	Case B	Case C
Country of Origin	Japanese car assembler	Japanese motorcycle assembler	US automobile assembler
Founded	1962	re-entered in 1998	re-entered in 1995
Annual production capacity (units/ 2014)	750,000	n/a	175,000
Number of employees (2014)	18,400	2,781	n/a
Nature of product	Passenger cars and commercial vehicles	Motorcycles	Passenger cars and commercial vehicles
Key Informants E=Expert	Two key informants: E1 is a Painting Division Manager with 18 years of experience E2 is a Product Manager with 12 years of experience	Three key informants: E1 is the Head of Engineering, Assembly Division with 22 years of experience E2 is the Head of Engineering Assembly Division with 24 years of experience E3 is the Deputy of Factory and Spray Division Manager with 20 years of experience	One key informant: E1 is a Senior Engineer with 5 years of experience

* E= Expert

The process of data collection comprised three steps for validity and reliability.

In step 1, a semi-structured interview method was applied for the first round of one-on-one expert interviews, at approximately 1.5 hours each.

Firstly, this researcher asked each expert to recall one of the most difficult projects they had previously completed, particularly for the purpose of sharing their motivation as to the project completion. Semi-structured questions for in-depth interviews comprised of: (a) Could you please briefly explain about the nature of your selected project? (b) Could you please explain the nature of the human resource management (HRM) policy on motivation (i.e., intrinsic and extrinsic motivation) working for the selected project/product series? (c) What/how is the process of HRM practices on the project team's motivation implemented in each project phase? (d) What is the nature of the relationship between team members involved in the operations contributing to the project success?, and (e) Is there any important point regarding the HRM practices on the project team's motivation during the three-project stages that I might have missed, and which you would like to add?

In step 2, all the data were compiled by a researcher, and then the outcomes of these interviews were sent to the interviewees for an accuracy check.

In step 3, after the correct version of the interview results was approved, it was finally reported in a case format. In this research, the researcher has relied upon both within-case and cross-case analyses (Yin, 2013). In addition, the researcher has looked for within-case and cross-case similarities and differences to gain insight

knowledge from research objectives.

Based on Yin (2013: pp.45-46), four tests (i.e., construct validity, internal validity, external validity, and reliability) have been commonly used to test the quality of any social research. Construct validity is to identify correct operational measures for the concepts being studied. *Internal validity* is to seek to establish a causal relationship, whereby certain conditions are believed to lead to other conditions, as distinguished from spurious relationships. *External validity* is to define the domain to which a study's findings can be generalized. *Reliability* is to demonstrate that the operations of a study—such as the data collection procedures—can be repeated, with the same results. For this research, these tests are applied throughout the subsequent conduct of a case study at its beginning. Table 2 provides how to test validity and reliability in this research.

Table 2 How to test validity and reliability in this research

Tests	How to Test Validity and Reliability for this Case Study Research
Construct validity	-Use multiple sources of evidence -Establish chain of evidence -Have key informants to review draft case study report
Internal validity	-Do pattern matching -Do explanation building -Use logic models
External validity	-Use theory -Use replication logic in multiple-case studies
Reliability	-Use case study protocol

Footnote: Applied from Yin (2013: pp.44-46)

4. Results

4.1. NPD projects in TIFs

As discussed in previous section, MNC automobiles in Thailand are viewed as TIFs, since they are constantly commissioning new product R&D projects to ensure advances in technology in the high-velocity environment. The Thai automotive industry, the so-called “Detroit of Asia”, has been promoting foreign investment in developing the Thai automotive industry since 1960. As of 2016, the Thailand automotive industry was the largest in Southeast Asia (BOI, 2016). The majority of MNCs investing in Thai automobiles, including the selected case companies, have adopted a localization strategy (Petison and Lahri, 2008) whereby local employees were involved in the product development process so that the product being offered to the market will meet local contexts and preferences (Ghoshal and Nohria, 1989). In addition, some work processes initiated at the headquarters

will be adjusted to correspond with the technology, skills and knowledge, and other conditions in the host country. These product/process developments and adjustments are commissioned through project-particularly in breakthrough and platform types of projects. This study focuses on the breakthrough projects that involve significant changes to existing products and processes incorporating revolutionary new technologies or materials (Wheelwright and Clark, 1992). Successful breakthrough projects establish core products and processes that differ fundamentally from previous models or generations. As such, the nature of projects in the study context involves knowledge transfer from the local to the parent company (e.g., the conditions of local market environment) and knowledge sharing with the region.

For example, Case A recognized the needs of locals for multi-purpose vehicles in the agricultural

business in up-country Thailand. Hence, the organization had commissioned a series of pickup truck projects to ensure that the one-ton pickup truck models offered to the market corresponded with the local needs. Another localized car model, adapted from the one-ton pickup truck, is the *Songthaew* (shared taxi), a type of public transportation in community areas. Another example from Case C is that the company applied a global platform of several US car models to the local production so that an economy of scale was achieved, which made an affordable car possible to local Thais. The above examples highlighted demands for product R&D projects, knowledge-sharing, and adaptation in the industry (Petison and Johri, 2006; 2008).

The following sections explain how the selected cases extrinsically and intrinsically motivated project people to contribute to project successes. This research asked key informants to share their views and to provide suggestions on how to effectively utilize motivational content, be it intrinsic or extrinsic, to enhance NPD success during each stage of the NPD project.

4.2. Motivation synergy for the three-Stage NPD project.

4.2.1. Motivation synergy for the beginning stage of the NPD project

Given the circumstances, cross-case analyses suggest that a project team was intrinsically motivated to work in projects at the beginning stage of an NPD project, so that the accumulated experience and skills, over time and across projects, would lead them successfully to the next career level more quickly, especially among those who were identified as the future leaders for the organization.

For example, E1 from Case A reported that the

company had an individual development plan wherein junior engineers were assigned to initially work in more simpler and less complex projects such as those in the derivative type. The experience and knowledge accumulated across different projects allowed them to gain opportunities to join more challenging tasks and projects. This was considered rewarding, particularly when the engineers had advanced to higher levels in the project challenge. Similarly, E1 from Case C explained that project managers selected the team based on their experience and skills. Those who were chosen to be part of the projects, in particular, the breakthrough type of projects, prided themselves on their levels of expertise which fulfilled individual esteem needs and recognition. Likewise, E1 and E3 from Case B admitted that they felt gratitude to be a key driver of breakthrough projects, and particularly for working closely with expatriates involved in the projects.

In summary, based on the three illustrative cases on a project team's motivation at the beginning stages of NPD projects, all cases have shown that intrinsic motivation toward the assignment is very strong. Further, they have shown that an NPD project team is deeply involved in the work they do because the assignment is interesting and challenging to them. At the beginning stage, all experts perceived of their rewards and recognition for the breakthrough project assignment, but they did not pay much attention to how much they received, nor compared the extrinsic rewards with their competences. For example, E1 and E2 from Case A and Case B similarly stated that, while they knew about rewards for the selected breakthrough project assignment, they were not significant due to

comparing those rewards to their opportunities to work with expatriates and learn from the many challenges of the project.

4.2.2. Motivation synergy for the ongoing stage of NPD project

Amabile (1993) points out that, during the ongoing stage of an NPD project, extrinsic motivation plays a more important role to facilitate a project team working as extrinsic motivators that work in service intrinsics. A synergistic motivation at the appropriate time may lead a project team during the ongoing project to higher levels of creative and productive work. The researcher also found that the extrinsic reward distribution method was also the key issue here.

For example, E1, E2 and E3 from Case B said that in fact the company did not allocate specific rewards for the achievement of the derivative type of projects; and only those platform and breakthrough types of projects were recognized. However, based on the empirical interpretation, extrinsic rewards were not only too small in size, but also the link between rewards and the project achievement was unclear. For example, E2 from Case A pointed the issue to the clarity of the reward-performance link, whereby the rewards were actually linked with the performance of all the projects undertaken by the whole engineering department, and not with the specific projects. In summary, one could see that the price system or the financial rewards being applied in these organizations could not serve their purpose for motivating results, because the project team experienced too much time pressure, rewards that were too small, and a lack of clarity on the performance-reward linkage.

Furthermore, the researcher explored the hindsight of extrinsic motivation utility in the study context through expert interviews. The interview data revealed that performance management system (PMS) in the subsidiaries at all levels, (i.e. division, unit and individual levels-are linked with the global strategy of their designated parent companies). Key performance indicators (KPIs) were related to the project roadmap such as the number of implementing projects, and time-to-market were applied in the PMS. Although the case companies deployed financial incentives to project performance, the experts' opinions suggested that these rewards were too small to motivate the project team who worked under such time pressure as in these R&D projects. In particular, in Case B and C, personnel assigned to the project teams handling breakthrough type of projects encountered considerable problems while the project timelines were unlikely to change. In addition, E1 from Case C said that while the teams were on assignment for a certain project with a specific timeline, they would also have to deal with the technical issues resulting from other projects for which they had been previously responsible. The issues arising from the previously implemented projects had more priority than the R&D projects on hand. Sometimes the problems persisted, and it took more time than expected to resolve. Therefore, the team had experienced time pressure for an on-time completion of the current projects on hand. He admitted that sometimes the team was quite frustrated when they had to compromise the project's quality with its completion deadline.

As to the project team's intrinsic motivation, it was found to remain strong during the ongoing stage.

For example, E1 from Case A said that, given his 18-year experience working for the company, not all his assigned projects were successful, some projects failed, and a number of times the project recommendations were not taken seriously although he retained a positive perspective. He said that he enjoyed the learning and sharing aspect of the projects; and sometimes the team could further develop new ideas from the sharing sessions.

4.2.3. Motivation synergy for the finishing stage of NPD projects

The finishing stage is the outcome of the NPD project's completion or failure. This researcher asked key drivers that helped them to continue project completion. Case A and Case C expressed their key drivers as being their enjoyment in learning and teamwork. For example, E1 from Case A and E3 from Case 3 expressed that they had learned much from problem-solving processes where the team discussed, shared, built on ideas, and finally came up with the solutions. This induced within them a sense of belonging to the projects, and worked hand-in-hand for aiming at the achievement of project goals. Similarly, E1 and E3 from Case B admitted that the key driving force that pushed their teams to overcome the project pressures was the team's increased knowledge from working closely with expatriates in the assigned projects, especially the practices of the Japanese quality management philosophy, e.g. "Kaizen"³ and "Genba"⁴. Moreover,

personnel in all the selected cases, felt that they were more competent working in the projects; and as a result, they had more confidence in utilizing their skills and knowledge to handle future projects. More importantly, this positive and memorable experience was carried over to the next project assignment, resulting in an uplifting feeling of joy. On the other hand, all cases have admitted that not all assigned projects from the parent company/headquarters were successful. Since the selected cases' parent companies supported the localization approach to product development, there were many challenges in the commissioned projects (e.g., a shortage of qualified personnel such as engineers about technology adaptation, large technological differences between headquarters and subsidiaries, etc).

5. Discussions and conclusion

This qualitative inquiry aims to investigate the project team's motivation for the NPD project performance in TIFs. It proposes to answer the specific research question of what and how motivation (i.e., intrinsic and extrinsic) synergistically works for the three stages of the NPD project (i.e., the beginning, ongoing and finishing). This research has offered an empirical study on three selected TIFs in which their project teams have already passed through in three-stage breakthrough NPD projects. The results are consistent with Amabile's (1993) motivation synergy and have

³Kaizen is the practice of continuous improvement.

⁴Genba is the real place what value is created, or where problems are visible.

gained some insights particularly in the context of the study linked to the stated managerial issues.

Based on Amabile (1993)'s motivation synergy theory, intrinsic motivation is needed for challenging product development projects whose complexities require creativity and perspectives to analyze and solve problems. Meanwhile, extrinsic motivation (e.g., incentive, financial rewards) serves as the condition under which the outcome variance of the intrinsic motivation drivers could be strengthened or diminished. As shown above, all the selected cases share the common themes on the facts as shown below.

(1) At the beginning stage of the NPD project, intrinsic motivation (being assigned on challenging projects, career development opportunities, knowledge and experience gained from the projects, and empowerment in the self-managed team environment) was an important driving force for project success. This echoes Amabile (1993)'s propose that a strong degree of intrinsic motivation toward the project assignment, particularly at the initial level, is very important in that one might expect additive effects of intrinsic and extrinsic motivation when intrinsic motivation is already salient.

(2) During the ongoing stage of the NPD project, financial incentives, did not by themselves, yield motivational results, supposedly owing to time pressure, workload, and relatively too-little rewards, given the circumstances. This study found that all the selected cases support this idea that most project members working in projects are fully motivated due to the work challenges in terms of creating novelty products, solving problems, and learning new knowledge. Together with

working in a team, they enjoy sharing common project goals and helping others. At the same time, they still want extrinsic rewards that reflect their effort, their potential and project performance. However, all the selected cases point to other factors impacting on their motivation. Example of these factors include changing project scopes that differ from their agreement on day one, limiting project resources and cutting the budget, accomplishing project deliver in time, and working on highly-complex projects that require high skills to apply new technology to suit the context. These factors caused them to feel de-motivated and eventually experience burnout. These circumstances echo the research of Amabile (1993) and Shaw and Gupta (2015) as to the important role of extrinsic rewards in services intrinsics, particularly during the ongoing phase that should reflect on project team competences (Amabile and Pratt, 2016; Makri et al., 20016), the level of project difficulty (Zhao and Chadwick, 2014), and the project duration (Bakker et al., 2013). Hence, this leads to:

Proposition 1: Extrinsic rewards will be positively related to the level of project difficulty.

Proposition 2: The synergy of motivation (extrinsic and intrinsic) will be positively related to the level of project difficulty when intrinsically motivated project teams perceive support by extrinsic rewards.

(3) At the finishing stage of the NPD project, based on cross-case analysis, this research found that the self-managed team approach to project management is the other source of project enjoyment. Project teams were empowered to plan, organize key resources and solve the arising issues by themselves. Knowledge-sharing and learning from others' experience were

common practices in the company cases on project management. This situation enhances on the creation of a project team's intrinsic motivation in that the team wants to achieve the project's goals because its members feel personally connected to the achievement of that project. This reflects on the project team's intrinsic motivation in that they show willingness to do anything needed to make the project work. This echoes many scholars' arguments that a project team's intrinsic motivation toward breakthrough NPD projects is crucial for encouraging the team members' continuous interest, enjoyment, and challenge of the activities themselves over long periods of project time (e.g., Dewett, 2007; Popaitoon and Popaitoon, 2016). While a project team may have strong, intrinsic motivation toward the project and perceive extrinsic rewards and recognition for achieving a successful project, the project can still be failure as empirical results have shown projects to fail because of skill shortages and the limitation of technology adaptation. It reflects on Amabile and Pratt (2016)'s creativity and innovation model. They point out the important factors that enhance NPD project success, not only in a project team's motivation to do the assignment, but also its members' skills in the assignment and innovation management (Keegan et al., 2018; Popaitoon and Siengthai, 2014).

Although this research sheds light on motivation in the NPD project of TIFs, some limitations should be noted. First, although data richness is an advantage for this interview method, its shortcomings include using open-ended questions requiring an experienced interviewer in order to gain as much necessary information from the participants, particularly as to the interview script for

analysis (Yin, 2013). This research uses a "stress-causal relationship" during in-depth interviews (Potter and Wetherell, 1987) to ensure that the results are relevant to the research question. Second, the key informants are Thais who possibly led the researcher to taking into account the Thai culture in the analysis of the way they perceived their social world (Smith, 1995). Accordingly, the researcher also triangulated data from other sources (e.g., industry publications, observation).

In summary, this research contributes to the synergistic roles of intrinsic and extrinsic motivation for the NPD project success. While both types of motivation can appear in a temporary state, project managers should design extrinsic rewards to support an intrinsically-motivated project team for each phase of the project and for rewards allocation. Particularly, project managers should be aware of the level of project challenge and difficulty; and suitable, expected rewards for a project team. In addition, the company should give full authority and autonomy to a self-managed project team to enhance its intrinsic motivation throughout the three-stage NPD project. Beyond a project team's motivation (extrinsic and intrinsic), the company should concern itself with a project team's prior-related knowledge and relevant skills for innovation management.

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