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Strategy, accountants' activities and new product development performance

Chia-Ling Lee *, Wen-Ying Wang [1]

Department of Accounting, National Chengchi University, Taipei 11605, Taiwan

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ABSTRACT

Prior literature indicates that activities carried out by accountants in new product development (NPD) are important. We explore the relationship between accountants' activities and NPD performance. We extend prior studies to identify the possible activities carried out by accountants within the NPD process to include five types of activities: basic, cost planning, cost control, profit management, and risk management. We argue that the relationship between accountants' activities and NPD performance is contingent on firm strategy. We mainly use sales from new products over total sales to measure NPD performance. Based on a large-scale survey, the findings confirm our conjecture that the effects of the five types of activities on NPD performance generally vary as a function of the strategy adopted by the firm. The implication of these findings is that in combination with the chosen strategy, firms should concentrate on the specific activities of accountants that can improve NPD performance.

1. Introduction

In an environment with shorter product life cycles and greater variation in customers' needs, new product development (NPD) has become one of the key elements of business competitiveness. Before reaching the manufacturing stage, the manufacturing conditions (e.g., manufacturing equipment, method and techniques) and the design and style of the products are fixed and the product costs have largely been determined (Clark & Fujimoto, 1991; Shields & Young, 1991). The flexibility for cost reduction is limited if one waits until the product design has been completed. Thus, to effectively reduce costs and increase competitiveness, appropriate management of new products at the development stage is necessary (Kato, 1993). In practice, the majority of companies set up a cross-functional team at the beginning of NPD (Clark & Fujimoto, 1991; Jassawalla & Sashittal, 1998).

Management control is one of the most significant systems to affect strategic resource allocation and innovation (Alder & Chen, 2011; Davila, Foster, & Li, 2009; Davila, Foster, & Oyon, 2009; Jørgensen & Messner, 2009; Taipaleenmäki, 2014). An accountant is an important member of the NPD cross-functional team and assists by providing financial information relevant to NPD (Rabino, 2001). A management accountant should be concerned about the relationship between new product design and cost in order to manage and control product costs at an early stage. An accountant's role changes from financial reporting to providing professional assistance and input for decisions (Hertenstein & Platt, 1998). When accountants are involved with NPD, they can affect NPD performance. Prior studies generally indicate that the management control system (MCS) influences the performance of NPD (Bisbe & Otley, 2004; Davila, 2000; Wang, Lin, & Huang, 2010). Contingency theory suggests that the fit between contextual factors and the design of the MCS is associated with superior organizational performance (e.g., Chenhall, 2003; Langfield-Smith, 1997). A firm's core strategy is an important contextual variable for companies facing dynamic markets, which affects the economic consequences of accountants' activities in NPD.

In this study we follow contingency theory, extending prior literature to examine how the fit between accountants' activities in NPD and a firm's core strategy enhances NPD performance. To comprehensively understand accountants' activities in the NPD process, we extend the classification of Sandino (2007) to separate accountants' activities into five categories: basic activities; cost planning activities; cost control activities; profit management activities; and risk management activities. We follow prior studies by using sales from new products over total sales to measure NPD performance (Cooper & Kleinschmidt, 1993; Hopkins, 1981; Song & Parry, 1996). Management accounting research indicates that the design of a management control system must be aligned with a firm's strategy (Langfield-Smith, 1997). Cooper

* Corresponding author.
E-mail addresses: leecl@nccu.edu.tw (C.-L. Lee), wywang1@nccu.edu.tw (W.-Y. Wang)

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(1995) indicates that companies place varying degrees of emphasis on targeting cost controls, depending on their product strategy. A company's strategy influences its management control system (Chenhall & Langfield-Smith, 1998; Cooper, 1995; Langfield-Smith, 1997; Simons, 1987; Tsamenyi, Sahadev, & Qiao, 2011). This is also supported by contingency theory, which indicates that strategy affects MCS and that the match between firm strategy and MCS affects firm performance (Chenhall, 2003; Gordon & Narayanan, 1984; Van der Stede, Chow, & Lin, 2006). Simons (1987) finds that prospectors, defined as firms that compete through new products and product development, tend to focus on qualitative forecast information and pay less attention to cost control. Jørgensen and Messner (2010) show that engineers engaged in NPD evaluate different design alternatives on the basis of both accounting information and a set of strategic objectives. Thus, companies facing limited resources should choose the most important control activities to align their strategies to enhance NPD performance. Accountants should provide cost information, performance reporting and ad-hoc analyses to support business processes for achieving strategic goals, which in turn can enhance NPD performance.

Research indicates that firms competing on the basis of product differentiation tend to move away from financial and other efficiency-based performance measures to measures that support the achievement of strategic positions associated with differentiation (Govindarajan, 1988; Simons, 1987). On the other hand, a cost-leadership strategy employed on a continuous basis is necessary to reduce product costs to ensure that products are available at low but profitable prices in competitive markets (Zott & Amit, 2008). A cost-leadership strategy achieves this goal through better management of manufacturing and materials to keep costs low, and refinement of the firm's knowledge along existing technological paths, among other factors. (e.g., Su, & Guo, H.,& Sun, W., 2017). Control activities operated by accountants should be modified in accordance with a firm's strategy to support NPD. Thus, accountants should align with a firm's strategy to carry out important control activities to enhance NPD performance.

However, relatively little research exists on the way in which management control systems are implicated in the connection between strategy and innovation (Chenhall, Kallumki, & Silvola, 2011; Jørgensen & Messner, 2010). This study examines how accountants' activities in NPD are employed in response to a firm's strategy and how they enhance NPD performance. Similar to prior accounting studies (Auzair & Langfield-Smith, 2005; Tsamenyi et al., 2011), we follow Porter (1985) to classify firm strategy into either cost leadership or differentiation. We sent questionnaires to executive financial officers (CFOs) of listed firms on the Taiwan Stock Exchange to collect relevant data. The questionnaire was composed of two parts. The first part asked about firm background including the firm's strategy, NPD performance and basic information. The second part asked about accountants' activities in NPD.

We use Taiwan as a research setting because its performance and competitiveness in R&D and business innovation is globally recognized. The Global Competitiveness Report of 2019, published by the World Economic Forum, ranked Taiwan fourth with regard to the innovation pillar. Taiwan's four-year economic development plan (2017–2020) includes investment in industrial innovation and implementation of structural reform.[2] According to this development plan, there are six specific methods: rewarding investment in industrial innovation; investment in next-generation infrastructure; regulatory reform; increase quality of manpower; improve national land planning; finance innovation and tax system reform. These main policies enhance innovation, improve business efficiency,[3] help recruit and retain foreign professionals and high-quality workers, and increase foreign investment. Kiyota, Oikawa, and Yoshioka (2017) indicate that high-skilled and medium-skilled workers have increased, while low-skilled workers have decreased in Taiwan. These results imply that in Taiwan, the increase of skilled workers benefits the production of final manufacturing goods and competitiveness. As the global economy becomes more integrated over time, Taiwanese electronics enterprises have shaped the landscape of the global supply chain (Lee & Wu, 2016; Tsai & Wang, 2004). For example, some of Taiwan's best-known companies, such as Taiwan Semiconductor Manufacturing Corporation, Honhai Precisions/Foxconn, MediTek, and Asustek Computers, have dominated worldwide ICT-related manufacturing. Many Taiwanese companies have built close relationships and formed strategic alliances with international conglomerates such as Apple, IBM, Intel, Qualcomm, and Hewlett Packard. We believe our findings in the context of a highly innovative and globally important economy can provide useful insights into the role of accountants in the development of new products. Moreover, Taiwanese corporations play an important role in the worldwide electronics industry from which 60% of our sample is derived. These suppliers have established specialized units through which they can develop products with their major international customers and effectively meet their demands.[4] Our results have international relevance and meaningful implications for global business practices.

This study contributes to the existing literature in several ways. First, in contingency theory, emphasis is placed on cooperation between a compliance program and contingency variables. In a competitive environment, corporate strategies become an important contingency variable in the management control system (Chenhall, 2003; Simons, 1987, 1990; Van der Stede et al., 2006). Recent literature investigates MCS in NPD (e.g., Janka & Guenther, 2019; Jørgensen & Messner, 2010). We examine the effect of the interaction between accountants' activities and the firm's strategy on NPD performance. The results provide accountants information on how to operate activities to support NPD, depending on the firm's strategy.

Second, most studies of MCS discuss the formal process adopted by management in order to provide information for decisions, planning, control and assessment (e.g., Chenhall, 2003; Malmi & Brown, 2008). Extending the perspective of management and control, this study focuses on the management and control activities provided by accountants. Prior studies have already identified the importance of MCS for firm performance while very few have focused on the role of accountants. No study to our knowledge has explored the idea that organizations that recognize the relationship between accountants' activities and strategy generate better NPD performance. Thus, we investigate how accountants' activities in NPD affect NPD performance under two different types of strategy: cost leadership and differentiation.

Third, this study extends prior studies by considering accountants' activities in the NPD process as basic activities, risk management activities, cost planning activities, cost control activities, and profit management activities. Sandino (2007) investigates how firms choose the MCS when they first invest in controls, and identifies four categories of initial MCS. These four types of MCSs include basic MCS, risk MCS, revenue MCS, and cost MCS. In addition to undertaking basic activities, accountants are typically also needed to provide information related to revenues and costs and to raise awareness of the financial risks involved. Therefore, we refer to the classification of Sandino (2007). However, in order to arrive at a comprehensive understanding of accountants' activities in the NPD process, we make some changes. We separate accountants' activities into five categories: basic activities, risk

[2] This information can be accessed from https://www.ndc.gov.tw/en/Content_List.aspx?n=7CF983D744B8B1C2.

[3] According to the 2019 IMD World Competitiveness Yearbook, rankings of all five subfactors in business efficiency improved for Taiwan in 2019. The factor of Attitudes and Values advanced most, from 23rd to 12th. Labor Market and Finance both climbed 6 places to 32nd and 15th, respectively; Management Practices attained 4th place, and Productivity and Efficiency advanced two notches to 17th.

[4] For instance, Quanta Computer Incorporated has invested a great deal in developing their server since 2000: the Cloud server was developed in 2006 while the AI server was created in 2016. As a result, Quanta Computer Incorporated has been among the biggest suppliers of AI Cloud servers, which are being sold to three other corporations in cloud computing (Microsoft, Google and Amazon).

management activities, cost planning activities, cost control activities, and profit management activities. Understanding the relationship between the five categories of activities and firm strategy is helpful for enhancing the performance of NPD. McKinnon, Harrison, Chow, and Wu (2003) state that Taiwan is a good example of a globally significant and successful economy, yet Bu, Peng, and Craig (2001) indicate that empirical studies of the work attitudes of Taiwanese employees are rarely found in the English language literature. Our findings thus fill a void in the accounting and management literature, and could assist companies in designing accounting control systems.

The remainder of the study is organized as follows. Section 2 reviews the literature and develops research hypotheses. Section 3 presents the research methodology. Section 4 discusses the empirical results. Finally, in section 5, we summarize the empirical evidence, discuss the implications of the research findings for corporate management, and offer suggestions for future studies.

2. Review of literature and hypothesis development

2.1. Accountants' activities and NPD

Accounting information assists managers in planning, evaluating and controlling operations (Buhaisi, 2011). Management accountants provide management with performance reporting and ad-hoc analyses, and they support business administration and project management (Byrne & Pierce, 2007). The industrial sector has paid more attention to NPD in recent years. Several companies have established cross-functional teams to benefit from different perspectives and to resolve problems arising in all sorts of areas (Clark & Fujimoto, 1991; Jassawalla & Sashittal, 1998). The management accounting literature highlights the role of accountants in NPD as business partners (Hughes & Pierce, 2006; Rabino, 2001). Burns and Baldvinsdottir (2005) also indicate that apart from its traditional roles, management accounting is becoming more widely involved in integrated business situations. For instance, Rabino (2001) states that companies face uncertainties in the development of new products and NPD teams require information related to the revenues and costs of new products. Thus, accountants are needed to provide financial information and raise awareness among the NPD team of the financial risks involved. The financial information required at the NPD stage involves setting targets, estimating the cost of new products, comparing the targets with the actual situation, and implementing kaizen costing (Rabino, 2001). Hertenstein and Platt (1998) investigated the changing role of management accountants in the process of NPD. They state that management accountants not only control the cost of materials and labor, and implement variance analyses, but also consider the relationship between product design and product cost in order to implement cost control at an early stage of NPD. An accountant's role has thus changed from being a provider of financial reports to being a specialist, assisting with decision-making in the process of NPD (Hertenstein & Platt, 1998). For instance, accountants should possess the ability to cooperate and communicate, and to liaise between the NPD team and top management. They should also understand the function of each department and its contributions to the NPD team, and call attention to product costs and the achievement of related financial targets. The target costing system at the NPD stage requires such a role of accountants. The CAM-I Target Cost Core Group (1997) indicates that the two phases in the target costing process are the establishment phase and the achievement phase. The establishment phase involves setting a target cost and includes seven major activities: market research, competitive analysis, defining customer or market niche, understanding customer requirements, defining product features, establishing a market price, and determining the required profit. The achievement phase involves achieving the target cost and includes three steps: computing the cost gap, designing costs out of a product, and releasing the design for manufacturing and performing continuous improvement. Kato (1993) indicates that current products provide a reference point for cost information and that information systems are indispensable tools to support target costing activities. Tanaka (2002) argues that accountants are important members of the cross-functional team under the target costing system and that the knowledge and capability of the accountants will affect the implementation of the system. He further indicates that accountants should have knowledge of the industry and technology development as well as be able to use suitable mechanisms to evaluate alternative solutions. Vaivio (2004) illustrates that certain non-financial management accounting measurements lead to more intense communication, debate and even resistance in the process of generating new initiatives. In sum, accountants should provide relevant information for the evaluation of product design alternatives so that a firm can effectively measure their costs and benefits.

With respect to controlling activities, Sandino (2007) investigates how firms choose an initial management control system when they first invest in controls, and separates management control systems into four categories: basic MCS, risk MCS, revenue MCS, and cost MCS. Basic MCS is the common platform that sets out plans and standards and supports basic operations (e.g., the budget, the pricing system and inventory controls). The purpose of the risk MCS is to reduce risks, protect asset integrity, avoid inconsistencies of information, secure and audit the systems, and avoid out-of-control situations that would jeopardize the growth and financial health of a business. Examples of risk MCS include loss prevention controls, policies and procedures, and credit controls. Revenue MCS is used to analyze external information, enhance revenue, support growth, and learn and respond to the market (e.g., learning about the market and competitors, marketing databases, and sales productivity). The purpose of cost MCS is to manage and understand costs, define goals, and provide information to help employees work efficiently and productively in order to achieve operational efficiencies and cost minimization (e.g., cost controls and quality controls). In addition to collecting and applying basic information, it is important for companies to pursue lower costs and higher sales with a specified product function and quality. Moreover, as the risk involved in NPD is high, appropriate risk management cannot be neglected.

Accountants' activities are bound up with the four MCS categories indicated by Sandino (2007). Therefore, we primarily classify accountants' activities with reference to Sandino. However, to accommodate the research design of this study and better understand accountants' activities in the NPD process, we have made two changes. First, we look at profit management activities instead of revenue management activities. The reason for this is that accountants tend to focus on estimating and analyzing costs and seldom consider just revenue. Thus, when making decisions, accountants consider the net effect on profit, not just how to increase revenues. Second, cost planning and cost control are two different cost management tasks when firms implement target costing. Therefore, regarding the role of accountants in managing costs, we separate cost activities into those providing information and cost planning, and those providing cost control and improvement.[5] To summarize, based on the possible activities in which accountants may be involved in NPD, we separate accountants' activities into five categories: basic activities, risk management activities, cost planning activities, cost control activities, and profit management activities.

2.2. Strategy, accountants' activities and NPD performance

Atkinson, Banker, Kaplan, and Young (2001) emphasize that management accounting and control systems should be designed for strategic purposes. In the development of new products, the use of control systems and related activities is influenced by firm strategy, and

[5] Management control systems are a means for collecting information to assist with planning and controlling decisions, and directing employees. By definition, the MCS focuses on planning and control. Thus, we further separate cost MCS into cost planning and cost control.

different strategies have different focuses, which further influence firm performance. Meeting the needs of the chosen strategy and allocating resources to the most important activities can help improve NPD performance. From the perspective of contingency fit, Gerdin and Greve (2004) indicate that different organizations have different levels of fit and that companies perform well when there is a better fit. Thus, coupled with the company's strategy, focusing on the management of important activities helps improve NPD performance.

Porter (1985) identifies two types of strategy: cost leadership and differentiation. Miles and Snow (1978) classify companies according to their strategy into prospectors, analyzers, reactors and defenders. Said, HassabElnaby, and Wier (2003) point out that prospectors provide differentiated products and emphasize the development of new products and new markets. On the other hand, defenders focus on the improvement of operating efficiency for their current products and markets so as to gain a competitive advantage through cost reduction. Durand and Coeurderoy (2001) indicate that the cost leadership strategy focuses on low cost and high efficiency and that innovation differentiation pays attention to innovation as a whole. Overall, prospectors and differentiators are close in nature, while defenders follow a strategy similar to cost leadership. Thus, we follow the classification of Porter (1985) and classify firm strategy into cost leadership and differentiation, and further, we identify which accountants' activities are beneficial for a given type of firm strategy to have better NPD performance.

2.3. Hypothesis development

2.3.1. Differentiation strategy and accountants' activities

Differentiation is reflected in product design, brand image, technology, product features, and customer service. Companies using a differentiation strategy emphasize basic research, product design, and quality of materials (Porter, 1985). Itami and Roehl (1987) suggest that companies should allocate more resources to product development, design, quality management, marketing and service if product function and quality are the main features of the business. To achieve product differentiation, companies should create cross-functional teams that collaborate with each other in the NPD process in order to overcome challenges inherent in innovation. McNally, Akdeniz, and Calantone (2011) and Durmuşoğlu, Calantone, and McNally (2013) provide empirical evidence supporting the claim that the extent of cross-functional integration affects NPD performance. Kraaijenbrink (2012) also finds that the difference between successful and unsuccessful projects lies primarily on the extent to which knowledge integration takes place. Employees are likely to respond to product differentiation strategies if they are encouraged to engage in debate on ideas and to cooperate with others (Chenhall et al., 2011).

It is important for those involved in basic activities to integrate data and cooperate and communicate with team members. In order to meet customers' needs and to respond to a changing environment, companies with a differentiation strategy are more likely to use flexible organizational structures and processes and apply subjective and non-financial measures to assess performance (Kaplan & Norton, 2004; Langfield-Smith, 1997; Miles & Snow, 1978; Simons, 1987). Therefore, such companies should pay attention to basic activities through the establishment of common platforms, as these will help improve NPD performance, e.g., by understanding the mid- and long-term strategy and product-level strategic planning, designing the forms needed, conducting performance evaluations, and cooperating and communicating with team members. Firms pursuing a cost-leadership strategy aim at offering the same or similar products at lower prices than competitors to attract customers and then to build competitive advantage (Porter, 1985; Song & Parry, 1997). Basic activities focus on communicating and building common platforms that are usually associated with exploration costs. Exploration may be cost-ineffective if it is detrimental to the basis of cost leadership. Basic activities would benefit a differentiation strategy more than a cost leadership strategy. The emphasis of the differentiation strategy is not only on new product function and quality, but also on product cost. As Cooper (1995) suggests, if one of these three elements falls outside of the target range, the newly developed product will lose competitiveness. Kaplan and Norton (2004) suggest that once the product features are confirmed, it is still necessary to control and manage costs. Simons (1987) also indicates that a successful differentiation strategy is likely to assign a high priority to budget targets and to work to ensure that the system is consistent in providing senior managers with comparative business unit information. A company with a differentiation strategy needs to have more information related to cost planning in order to control innovation costs. We believe that if companies put more effort into cost planning and cost analyses at an earlier stage, it will help them achieve their targets for product function, quality and cost. These efforts include computing the cost of capital required to develop new products, estimating the life-cycle costs of new products, setting and decomposing cost targets for new products, preparing budgets for new products, participating in the design and maintenance of the cost table, and analyzing how product costs vary with product design. These efforts can be taken in cost planning activities, such as setting cost targets for products, decomposing the cost targets, and preparing budgets for new products.

In contrast, the key to an effective cost-leadership strategy is to continuously reduce product costs to ensure the firm is competing at low but profitable prices (Zott & Amit, 2008). Firms with a cost-leadership strategy have various ways to achieve this goal, such as better managing manufacturing and materials to ride down the experience curve to keep lowering costs, and refining their knowledge along the existing technological path (e.g., Su, & Guo, H.,& Sun, W., 2017). These ways are more relevant to cost control than cost planning.

We thus expect that the perceived importance of basic activities and cost planning activities has a positive effect on NPD performance for firms with a differentiation strategy more than for firms with a cost leadership strategy. Based on the aforementioned arguments, we propose the following two hypotheses related to a differentiation strategy:

H1: The perceived importance of basic activities has a positive effect on NPD performance for firms with a differentiation strategy.

H2: The perceived importance of cost planning activities has a positive effect on NPD performance for firms with a differentiation strategy.

2.3.2. Cost leadership strategy and accountants' activities

Under a cost leadership strategy, companies should invest in high quality and highly efficient production equipment to achieve economies of scale. To reduce costs, companies can emphasize product designs that are easier to manufacture, negotiate better prices for materials, and/or achieve cost reductions related to research and development, services, sales and advertising (Porter, 1985). Itami and Roehl (1987) also state that companies wishing to appeal to cost-conscious or price-sensitive customers will continuously invest in equipment, rationalize their manufacturing systems, accumulate know-how, and rationalize their material supply systems. The focal point for companies using a cost leadership strategy is the monitoring of costs (e.g., cost comparisons with competitors and tracking the trends in costs), which can improve operational efficiency and assist with problem-solving (Langfield-Smith, 1997; Miles & Snow, 1978). Thus, these companies should reduce both the time and the cost of R&D and put little effort into planning and analyzing in the early stages of NPD as they should be focusing on resolving any problems related to their new products. As a result, accountants should focus on activities associated with expectation management, such as setting the cost standards for products, providing reports on the

status of achieving cost targets, analyzing the reasons for variances, providing data about process improvement analyses, and providing suggestions for cost improvements. Davila (2000) interviewed project managers and indicates that if project managers emphasize new product launching, cost control and variance analyses are perceived as more important. Moreover, under a cost leadership strategy, accountants should not only consider revenues but also costs in order to maintain cost competitiveness. Thus, they should spend more effort on profit management activities such as profit analysis of the new product portfolios, and assist in interpreting financial information and preparing product reports.

In contrast, firms with a differentiation strategy aim at delivering valuable and different products to attract customers (Peng, 2006; Porter, 1985). The key to a differentiation strategy is that a firm can develop differentiated products to build customer loyalty and command premium prices in the long run (Knight & Cavusgil, 2004). There are various ways to achieve competitive advantage for a differentiation strategy, such as research and development, and marketing and sales, providing excellent service to satisfy customers' desires and after-sale needs (Peng, 2006; Su, & Guo, H.,& Sun, W., 2017). Firms with a differentiation strategy benefit from these activities in the long run. If they focus on cost control or profit management, they would tend not to invest in these costly activities. Thus, a differentiation strategy focuses on product planning rather than profit management to gain competitive advantage.

Regarding risk control and management, businesses adopting a cost leadership strategy should reduce uncertainty and ensure that outcomes are consistent with their initial plans. This is because the time frame for NPD is shorter today than in the past, and any change in the marketplace may affect the achievement of cost targets (Miles & Snow, 1978). That is, response time is shortened while market variance is higher. Gordon, Loeb, and Tseng (2009) also find that when market variability is high, companies tend to increase their control and management of risks. Risk management leads to better efficiency, a better understanding of risks, a better basis for resource allocation, reduced earnings volatility, and decreased regulatory costs (Gates, Nicolas, & Walker, 2012). If companies do not manage risk well, they are likely to lose cost competitiveness because of failing to respond in time. Thus, we conjecture that companies with a cost leadership strategy tend to avoid situations that could potentially damage their growth and financial health. Information is the key asset that can help reduce uncertainty (Oestreich, Buytendijk, & Hatch, 2011). In order to achieve cost targets and enhance NPD performance, a cost leadership strategy should emphasize risk management activities on assessing the financial position of the suppliers, and designing and maintaining the accuracy and security of data systems. In contrast, a differentiation strategy usually aims at developing unique products at a premium price where customer demand is unknown, requiring risk-taking (e.g., Linton & Kask, 2017). If differentiators focus more on risk control and management, they are more likely to eliminate higher-risk innovation projects, and those programs may deliver unique products at a premium price to customers. This activity of risk control could suppress differentiators' NPD and NPD performance. Based on this logic, we hypothesize that:

H3: The perceived importance of cost control activities has a positive effect on NPD performance for firms with a cost leadership strategy.

H4: The perceived importance of profit management activities has a positive effect on NPD performance for firms with a cost leadership strategy.

H5: The perceived importance of risk management activities has a positive effect on NPD performance for firms with a cost leadership strategy.

Fig. 1 shows the structure of our research hypotheses.

3. Research method

3.1. Sample collection

Our study uses a large-scale survey for the following two reasons. First, information about the activities of accountants in NPD, the strategies used for NPD, and NPD performance is internal data and difficult to obtain. Second, some companies may not have measurement data for NPD. Therefore, we first relied on the extant literature to deduce the possible activities that accountants might be involved in during the development of new products. We interviewed eight top managers with accounting or management backgrounds at five listed companies that have good NPD performance to revise the indicators. In addition to their diverse strategies, these five companies were in different industries that vary from short-term to long-term production, such as electronics (computer and peripheral equipment, semiconductors, and electronic parts/components), biotechnology and the medical care industry, and the automobile industry. Since the impact of the work of accountants on NPD performance is the main focus of this research, selecting companies with poor NPD performance would be less informative, and could overlook important accounting procedures that can positively affect NPD performance. Therefore, we selected interviewees who do well in their NPD performance. On average they spent two hours in the interview reviewing the survey and giving feedback. They provided suggestions particularly on whether it was essential to add, delete or revise items related to the possible activities that accountants might be involved in during the development of new products, and how these activities might affect company operations. After revising our questionnaire, we conducted a pilot test. The test was conducted on EMBA students at a leading national university in Taiwan. In June 2007, we distributed the questionnaire to the CFOs of all listed companies in select industries in Taiwan.[6]

3.2. Variables

3.2.1. Dependent variable

We define new products in our survey by three steps. First, we refer to Clark and Wheelwright (1992) to differentiate projects as either "major model change," which requires a high level of innovation, or "minor model change." The projects with major model changes require far more effort, upgrading of infrastructure, time, and money than minor model changes.[7] Second, we incorporated feedback from five financial officials from Taiwanese listed corporations and survey data from EMBA students in the College of Commerce at a national university in Taiwan. We define new products as major new products that have been completely renewed by major model changes.

Cooper and Kleinschmidt (1993) use the profitability of new products, technical success, annual sales of new products in the first three years, relative market share, and the effect of sales and profits from new products on the company as a whole, to measure the performance of new products. Song and Parry (1996) indicate that the success of a new product is mainly associated with four measurement indicators: product profitability, relative sales, relative market share, and whether the new product provides new opportunities for the company. Overall, the extant literature suggests that NPD performance is mainly related

[6] We excluded the financial and the utilities sectors as they are subject to different regulations. We also excluded the wire and cable, tourism, and general merchandising sectors because, given the nature of these industries, they were less likely than other industries to be involved in new product development at the time the survey was conducted.

[7] For example, there are many generations of the Toyota Corolla. The 12th-generation Toyota Corolla Altis was launched in 2019. This is a major model change with three main innovative features including an all-new hatchback edition, a stronger engine with petrol-electric model, and a design based on the company's Toyota New Global Architecture (TNGA). An example of a minor model change is the 11th-generation Toyota Corolla Altis which was launched in 2016. There are essentially no changes to the Corolla. The minor innovations included a redesigned lower rear bumper, side skirts, clear tail lamps, and spoilers.

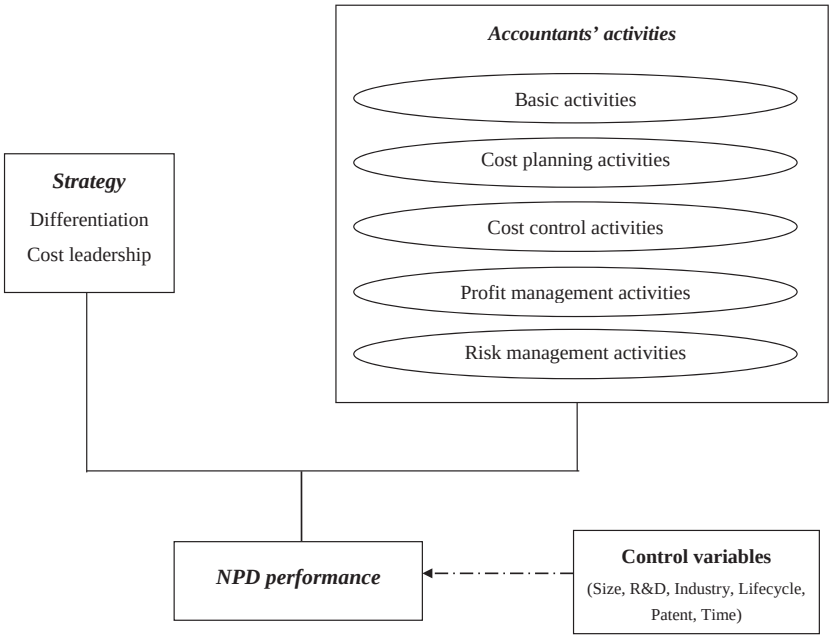

Fig. 1. The research structure of this study.

to product sales, revenue growth, customer acceptance, and customer satisfaction. Many measures, such as revenue growth, market share, and customer acceptance, have a close relationship with product sales. Moreover, NPD performance should be assessed through financial evaluation, objective evaluation, and the proportion of sales made from new products (Hopkins, 1981). We follow prior studies and use sales from new products over total sales as a proxy for NPD performance (Cooper & Kleinschmidt, 1993; Hopkins, 1981; Song & Parry, 1996).

3.2.2. Independent variables

As relatively few studies directly investigate the impact of accountants' activities on NPD performance, we rely on the literature on accountants' activities, accountants' capabilities, and NPD management systems to derive possible activities that accountants might be involved in during NPD. We identify 29 items and classify them into appropriate activities categories.

Basic activities include understanding mid- and long-term strategy and product-level strategic planning, designing the forms needed, conducting performance evaluations and attributing responsibility, and cooperating and communicating with team members (Böer, 2000; Hertenstein & Platt, 1998; The CAM-I Target Cost Core Group, 1997).

Cost planning activities has 12 items that include providing cost information related to current products, providing cost information related to different departments, computing the cost of capital required to develop new products, estimating the lifecycle costs of new products, setting cost targets for new products, decomposing the cost targets, and preparing budgets for the new products, (Böer, 2000; Hertenstein & Platt, 1998; Rabino, 2001; The CAM-I Target Cost Core Group, 1997).

Cost control activities consist of the following six items: providing progress reports on the status of achieving cost targets and analyzing the reasons for any variance, providing financial data using process improvement analyses, analyzing the costs and benefits of each proposal, providing suggestions for cost improvements, setting the cost standards for products, and reasonably allocating indirect costs (Böer, 2000; Rabino, 2001; The CAM-I Target Cost Core Group, 1997).

Profit management activities consist of providing profit analyses of new product portfolios, analyzing the effect of capital expenditures on taxes, preparing budgets for capital expenditures, and preparing product reports (Hertenstein & Platt, 1998; The CAM-I Target Cost Core Group, 1997).

Risk management activities include knowing the industrial environment in which the company operates, analyzing the feasibility of NPD, providing information on exchange rate changes, and assessing the financial position of the company's suppliers (Hertenstein & Platt, 1998; The CAM-I Target Cost Core Group, 1997).

After interviewing top managers from five listed companies, we added another six items. These relate to the cost allocation of indirect costs, information on relevant laws and regulations (e.g., commodity taxes, tariffs, business taxes, a statute for the encouragement of investment), analyzing whether NPD is in compliance with tax incentive conditions, designing and maintaining the accuracy and security of the data system, data integration so that team members can quickly obtain the data needed, and assisting with the interpretation of financial data.[8] On the final questionnaire, a total of 35 items represent accountants' activities in new product development.

3.2.3. Control variables

Prior studies indicate that greater R&D investments are associated with better financial performance (e.g., Lev & Sougiannis, 1996; Lin, Lee, & Hung, 2006; Sougiannis, 1994; Zhang, Li, Hitt, & Cui, 2007). Song and Thieme (2009) argue that company size may affect the performance of new products and the achievement of innovation. In addition, the nature of the industry may affect the competitive environment, product characteristics, the business model and business risks. Aaker (1989) indicates that most industries have a set of relevant assets and skills that provide the foundation for maintaining a sustainable competitive advantage. A firm's focus on management may vary with its product lifecycles. Managers of firms with longer product lifecycles rely more on information for long-term planning (e.g., Bizjak, Brickle, & Cole, 1993; Bushman, Indjejikian, & Smith, 1996). Firms with relatively shorter product lifecycles may focus more on cost control due to the need to develop new products to respond quickly to customer needs and shorter advanced

[8] These six items might be the operations and management activities that businesses are most concerned with. The allocation of indirect costs can help a firm analyze how changes in product design affect product costs. An understanding of the relevant regulations and tax incentives can avoid violations of laws and may be associated with business performance. Providing and obtaining the required data promptly and maintaining the accuracy and security of the information system can assist with making timely decisions. Accountants can also assist with interpreting the implications of financial data, which helps with problem-solving and decision-making.

planning (e.g., Bushman et al., 1996; Dunk, 2004). Previous studies support that patent measures are associated with firm performance (Connolly & Hirschey, 1988; Deng, Lev, & Narin, 1999; Griliches, 1990). Furthermore, there may be a tradeoff between product performance and time to market (e.g., Calantone & Di Benedetto, 2000; Cohen, Eliasberg, & Ho, 1996). Therefore, we control for R&D, company size, industry characteristics, product lifecycle, patents, and time to market.

The questionnaire contains two parts. The first part asks about the company's background (e.g., main competitive strategy,[9] average product lifecycle, average time to market, and sales from new products over total sales). The second section asks about the importance of the various activities carried out by accountants for NPD. We use a five-point Likert scale (very unimportant, unimportant, neither unimportant nor important, important, very important) for the assessment. If "very important" or "important" is chosen, the company is likely to spend more resources and time on improving and managing the specific activities of accountants.

3.3. Regression model

As accountants are involved with several activities in the development of new products, we initially use factor analyses and extract eigenvalues greater than 1 and factor loadings higher than 0.5, following Hair Jr., Anderson, Tatham, and Black (1998). We also adopt the sphericity test of Kaiser-Meyer-Olkin (KMO) and Bartlett as an assessment analysis. We use a Cronbach's α greater than 0.6 as the selection criterion to ensure that the factors are reliable. We separate the companies into two groups based on strategy, and perform the following regression model for each group:

$$\begin{aligned}\text{Performance}_i = {} & \alpha_0 + \alpha_1 \text{Basic}_i + \alpha_2 \text{Costplanning}_i + \alpha_3 \text{Costcontrol}_i \\ & + \alpha_4 \text{Profit}_i + \alpha_5 \text{Risk}_i + \alpha_6 \text{RDTA} + \alpha_7 \text{Size}_i \\ & + \alpha_8 \text{Industry}_i + \alpha_9 \text{Lifecycle}_i + \alpha_{10} \text{Patent}_i + \alpha_{11} \text{Time}_i \\ & + \alpha_{12} \text{Strategy}_i + \alpha_{13}\ \text{Basic}_i * \text{Strategy}_i \\ & + \alpha_{14} \text{Costplanning}_i * \text{Strategy}_i \\ & + \alpha_{15} \text{Costcontrol}_i * \text{Strategy}_i + \alpha_{16}\ \text{Profit}_i * \text{Strategy}_i \\ & + \alpha_{17}\ \text{Risk}_i * \text{Strategy}_i + \varepsilon_i\end{aligned}$$

Performance is the performance of NPD, measured as sales from new products divided by total sales; *Strategy* is a dummy variable equal to 1 for the differentiation strategy, and 0 for the cost leadership strategy; *Basic* indicates the importance of basic activities; *Cost_planning* indicates the importance of cost planning activities; *Cost_control* indicates the importance of cost control activities; *Profit* indicates the importance of profit management activities; *Risk* indicates the importance of risk management activities. We control for R&D, company size, industry characteristics, product lifecycle, patents, and time to market. Thus, in Equation (1) we use the control variables *RD_TA*, measured as the average value of R&D expenditures over the past three years divided by the average value of total assets over the past three years, and *Size*, measured as the natural logarithm of average net sales over the past three years. Patents and time to market affect firm performance, and hence we also use the control variable *Patent*, measured as the number of Taiwan patents granted to the company (patent count) during 2007, and *Time*, measured as the average time to market over the prior three years. Taiwan's electronics industry has been a pillar of its prosperity for the past four decades, turning Taiwan into a key supplier for companies such as Apple, IBM and Dell. Thus, we include a dummy variable, *Industry*, equal to 1 if the company belongs to the electronics sector and 0 otherwise. We also control for product life cycle. *Lifecycle* is a dummy variable equal to 1 if a company's product lifecycle is shorter than the sample median, and 0 otherwise.

[9] Main strategy is either cost leadership or differentiation. This single-item measure was originally developed via Porter's (1985) classification, which was used to capture a company's strategy. Researchers have also provided empirical evidence for the reliability and validity of single-item measures (e.g., Bergkvist & Rossiter, 2007; Wanous, Reichers, & Hudy, 1997).

4. Empirical results

4.1. Sample description

A total of 1,026 questionnaires were distributed to listed companies in Taiwan, producing a valid return rate of 10.3%. In total, there were 106 valid responses after excluding 3 responses.[10] Of these 106 responses, 82 individuals are CFOs or controllers. Twenty individuals are administrators or executive supervisors. Four individuals left the title of their position blank. We use non-response error to test the representativeness and validity of the sample. The chi-square of the difference between the sample distribution in industries and the distribution of all Taiwan listed companies in industries is insignificant (χ^2=33.89; $p < 0.33$), suggesting that the sample used in this study is representative. Table 1 reports the results of the factor analyses. Among the activities, the item "understanding the mid- and long-term strategy and product-level strategic planning," has factor loading less than 0.5, and therefore we exclude this item from our analyses. The factor loading of "analyzing the feasibility of NPD" (0.476) is very close to 0.5, so we keep it to avoid missing a possibly important item. After excluding one item, the values of Cronbach's α of all activity types are greater than 0.6. Our multiple-question Likert scale surveys are reliable according to the suggestion of Hair Jr. et al. (1998). Table 2 shows results of confirmatory factor analyses.

Table 2 shows the descriptive statistics. We use the factor loading of each item and calculate the weighted average for different activity types. The weighted average mean for each activity type is close to 4, suggesting that each type has a certain level of importance. Of the industry characteristics, most of the respondents worked in the electronics industry (59.43%), followed by the food and textiles industry (8.49%), the electric machinery industry (6.60%), the biotechnology and medical care industry (4.72%), the chemical industry (4.72%) and the iron and steel industry (4.72%). In our sample, 56 (52.8%) and 50 (47.2%) companies indicated that they use the differentiation strategy and the cost leadership strategy, respectively. There is great variability of patent and time to market among the sample firms. Table 3 reports the correlation analyses. The results show that there are insignificant correlations between activities and NPD performance. These findings indicate that there is no particular problem with collinearity.

In our sample, 56 (50) companies indicated that they use the differentiation strategy (the cost leadership strategy). Compared to firms using the cost leadership strategy, firms using the differentiation strategy seek opportunities for new products or new markets, consistently develop new products or technology (Chong & Chong, 1997), and focus on employee skills (Conant, Mokwa, & Varadarajan, 1990). Thus, differentiators put more effort into innovation activities, are highly R&D intensive, and have higher marketing expense ratios (i.e., marketing expenses over net sales) relative to cost leaders (Hambrick, 1983; Ittner, Larcker, & Rajan, 1997; Said et al., 2003). Ittner et al. (1997) and Said et al. (2003) find that prospectors generally have a higher market-to-book ratio.[11] Following the existing literature, we further explore whether there is any difference in the aforementioned company characteristics (i.e., R&D intensity, the marketing expense ratio, and market-to-book ratio) between companies using the differentiation and cost leadership strategies. Table 4 shows that companies adopting the differentiation strategy

[10] These respondents indicated that their ratio of sales from new products over total sales is zero. It means they do not have any sales from NPD. Thus, it is not suitable to study their NPD performance.

[11] Following prior literature (Durand & Coeurderoy, 2001; Miles & Snow, 1978; Porter, 1985; Said et al., 2003), the characteristics of prospectors and differentiators are close in nature, while defenders follow a strategy similar to cost leadership. We then use the measure of prospectors (defenders) from Ittner et al. (1997) and Said et al. (2003) to be the objective proxy for differentiators (cost leaders).

Table 1
Factor analyses and reliability test of accountants' activities (n=106).

Factors	Items	Factor loading	Eigen-values	% of variance	Cronbach's α
Basic activities	Providing information on relevant laws and regulations	0.587	2.970	49.497%	0.795
	Analyzing whether NPD is in compliance with tax incentive conditions	0.738			
	Designing the forms needed	0.780			
	Integrating data	0.768			
	Conducting performance evaluations and attributing responsibility	0.740			
	Cooperating and communicating with team members	0.578			
Cost planning activities	Providing cost information related to current products	0.658	5.580	42.920%	0.886
	Providing cost information related to different departments	0.607			
	Providing the cost allocation of indirect costs	0.608			
	Computing the cost of capital required to develop new products	0.599			
	Estimating the lifecycle costs of new products	0.536			
	Setting cost targets for new products	0.721			
	Decomposing the cost targets	0.753			
	Preparing budgets for the new products	0.632			
	Participating in the design and maintenance of the cost table	0.714			
	Understanding of value engineering and value analysis	0.574			
	Providing cost information related to new products that are still at the development stage	0.697			
	Analyzing how product costs vary with product design	0.694			
	Providing relevant cost information from make-or-buy analyses	0.685			
Cost control activities	Providing progress reports on the status of achieving cost targets and analyzing the reasons for any variance	0.688	3.511	58.519%	0.857
	Providing financial data using process improvement analyses	0.754			
	Analyzing the costs and benefits of each proposal	0.840			
	Providing suggestions for cost improvements	0.844			
	Setting the cost standards for products	0.709			
	Reasonably allocating indirect costs	0.739			
Profit management activities	Providing the profit analyses of new product portfolios	0.590	2.234	55.850%	0.727
	Analyzing the effect of capital expenditure on tax and preparing budgets for capital expenditures	0.734			
	Assisting the interpretation of financial data	0.843			
	Preparing product reports	0.797			
Risk management activities	Knowing the industrial environment in which the company operates	0.583	2.221	44.423%	0.685
	Analyzing the feasibility of NPD	0.476			
	Providing information on exchange rate changes	0.706			
	Designing and maintaining the accuracy and security of data systems	0.768			
	Assessing the financial position of the company's suppliers	0.753			

have significantly higher R&D intensity and market-to-book ratio, and a marginally higher marketing expense ratio. These results support the validity of our data.

4.2. The effect of strategy and accountants' activities on NPD performance

Table 5 reports the effect of strategy and accountants' activities on NPD performance. Table 5, Model 1 finds that the main variables, accountants' activities, are not significant. However, Model 2 shows that including the interactions of strategy and accountants' activities in the regressions, the coefficients on the interaction terms of Strategy*Basic, Strategy*Cost_planning, Strategy*Profit, and Strategy*Risk are significant. The coefficient on Strategy*Basic is significantly positive ($p < 0.05$). This result implies firms with a differentiation strategy that emphasize basic control activities obtain better NPD performance. [12] The coefficient on Strategy*Cost_planning is positive and significant (0.817, $p < 0.01$). This implies that firms with a differentiation strategy more frequently use the information provided by cost planning activities and by doing so, achieve better NPD performance.[13]

The coefficient on the interaction term Strategy*Profit is significantly negative ($p < 0.01$). This result indicates that if differentiators focus more on the new product's profitability, this is not helpful to NPD performance. Prior literature supports our results. The firms with a differentiation strategy aim to develop differentiated products to build customer loyalty and command premium prices in the long run (Knight & Cavusgil, 2004). They achieve competitive advantages through R&D, marketing and sales, and excellent service to satisfy customers' desires and after-sale needs (Peng, 2006; Su, & Guo, H.,& Sun, W., 2017). The implications of our results indicate that if firms with a differentiation strategy focus on profit management, they tend to restrict spending on these costly activities. Thus, differentiators with more focus on the profit management of innovation would be more likely to allow NPD projects to fall by the wayside, which would restrain NPD and NPD performance.

Differentiators are more innovative. In Table 5, Model (2) indicates that the coefficient on the main variable Profit is positive and marginally significantly. This means that cost leaders enjoy better NPD performance while their accountants place more emphasis on such activities as providing the profit analyses of new product portfolios, analyzing the effect of capital expenditure on tax and preparing budgets for capital expenditures, assisting in the interpretation of financial data as well as preparing product reports. The coefficient of Strategy*Risk is negative and marginally associated with NPD performance ($p < 0.1$). Differentiators that place greater emphasis on risk management activities achieve inferior NPD performance relative to cost leaders. Compared to differentiators, cost leaders that focus more on knowing the industrial environment in which the company operates, analyzing the feasibility of NPD, providing information on exchange rate changes,

[12] Basic activities include providing information on relevant laws and regulations, analyzing whether NPD is in compliance with tax incentive conditions, designing the forms needed, integrating data, conducting performance evaluations and attributing responsibility, and cooperating and communicating with team members.

[13] The accountants' activities for cost planning include: computing the cost of capital required to develop new products, estimating the lifecycle costs of new products, setting cost targets for new products, decomposing the cost targets, participating in the design and maintenance of the cost table, providing cost information related to new products that are still at the development stage, and analyzing how product costs vary with product design.

Table 2
Descriptive statistics (n=106).

Panel A	
Firm size (average value of net sales over the past three years; in millions NT dollars)	
Less than 1,000	20 (18.87%)
1,001-2,000	21 (19.81%)
2,001-4,000	24 (22.64%)
4,001-12,000	21 (19.81%)
Greater than 12,000	20 (18.87%)
Industry characteristics	
Electronics	63 (59.43%)
Food and textiles	9 (8.49%)
Electric machinery	7 (6.60%)
Biotechnology and medical care	5 (4.72%)
Chemical	5 (4.72%)
Iron and steel	5 (4.72%)
Others	12 (11.32%)

Panel B:

Variables	Mean	Stdev	Minimum	Median	Maximum
Basic	3.798	0.595	2.046	3.815	5.000
Cost_planning	3.900	0.503	2.593	3.917	5.000
Cost_control	3.867	0.565	1.963	3.850	5.000
Profit	3.859	0.576	1.597	3.951	5.000
Risk	3.802	0.565	2.111	3.771	5.000
Strategy	0.528	0.502	0	1	1
RD_TA	0.026	0.032	0	0.016	0.222
Size	15.158	1.629	11.676	14.867	19.922
Industry	0.594	0.493	0	1	1
Lifecycle	0.472	0.502	0	0	1
Patent	21.764	75.828	0	1	716
Time	12.892	20.065	1	9	200
Performance (%)	24.159	24.071	0.01	15	100

Notes: Basic, Cost_planning, Cost_control, Profit, and Risk indicate the importance level of each type of accountants' activities. Strategy is a dummy variable equal to 1 for the differentiation strategy, and 0 for the cost leadership strategy. RD is measured as the average value of R&D expenditures divided by the average value of total assets over the prior three years. Size is the natural logarithm of net sales over the prior three years. Industry is a dummy variable equal to 1 for electronics industry sectors, 0 otherwise. Lifecycle is a dummy variable equal to 1 if a company's product lifecycle is shorter than the sample median, 0 otherwise. Patent is the number of Taiwan patents granted to the company in 2007. Time is the average time to market. Performance is measured as sales from new products divided by total sales.

Table 4
Univariate analyses of company characteristics.

	R&D intensity (%)	Marketing expense ratio (%)	Market-to-book ratio
Differentiation strategy (n=56)			
Mean (1a)	3.394	6.901	2.254
Median (1b)	2.306	4.298	1.748
Std. Deviation	3.430	7.444	1.767
Cost leadership strategy (n=50)			
Mean (2a)	1.978	4.777	1.285
Median (2b)	1.565	3.827	1.161
Std. Deviation	2.211	3.714	0.580
Difference in mean and median values			
(1a) – (2a)	1.416**	2.124*	0.969***
(1b) – (2b)	0.741**	0.471	0.587***

Note: ***, **, * indicate two-tailed significance at the 1%, 5%, and 10% levels, respectively. R&D intensity (%) is the ratio of research and development (R&D) to sales. Marketing expense ratio (%) is the ratio of marketing expenses to sales. Market-to-book ratio is the ratio of total market value to total book value.

designing and maintaining the accuracy and security of data systems, and assessing the financial position of the company's suppliers would enjoy better NPD performance. Cost leaders focusing on those activities would reduce risk from growth and finance to prevent losing their cost advantage. The term of Strategy*Cost_control is not significant and H3 is not supported.

In sum, our initial results support H1, H2, and H4 and marginally support H5. Firms with a differentiation strategy focus more on basic activities and cost planning activities to obtain better NPD performance, while firms with a cost leadership strategy focus on profit management activities and risk management activities to achieve better NPD performance.

4.3. The relationship between activities and NPD performance for different strategies

We next divide the full sample into two groups (cost leadership and differentiators) to test the relationship between activities and NPD

Table 3
Correlation analyses (n=106).

	Strategy	Basic	Cost_planning	Cost_control	Profit	Risk	RD_TA	Size	Industry	Lifecycle	Patent	Time	Performance
Strategy	1	−0.088	−0.068	−0.165	−0.041	−0.019	0.288	0.016	0.220	−0.016	0.001	0.097	−0.065
		(0.372)	(0.489)	(0.090)	(0.673)	(0.843)	(0.003)	(0.868)	(0.023)	(0.873)	(0.991)	(0.325)	(0.507)
Basic	−0.084	1	0.784	0.763	0.830	0.810	0.078	0.032	0.044	−0.059	−0.076	−0.019	0.013
	(0.392)		(0.000)	(0.000)	(0.000)	(0.000)	(0.426)	(0.741)	(0.655)	(0.545)	(0.437)	(0.848)	(0.898)
Cost_planning	−0.074	0.758	1	0.778	0.779	0.835	0.202	0.160	0.113	−0.075	0.083	0.015	0.015
	(0.452)	(0.000)		(0.000)	(0.000)	(0.000)	(0.037)	(0.102)	(0.251)	(0.444)	(0.396)	(0.875)	(0.880)
Cost_control	−0.151	0.717	0.743	1	0.746	0.742	0.058	0.205	0.086	−0.008	0.022	−0.005	0.066
	(0.122)	(0.000)	(0.000)		(0.000)	(0.000)	(0.554)	(0.035)	(0.379)	(0.934)	(0.821)	(0.956)	(0.501)
Profit	−0.050	0.828	0.757	0.696	1	0.747	0.052	0.152	0.065	−0.014	0.015	−0.024	0.005
	(0.608)	(0.000)	(0.000)	(0.000)		(0.000)	(0.598)	(0.120)	(0.510)	(0.887)	(0.875)	(0.807)	(0.960)
Risk	0.027	0.776	0.771	0.706	0.718	1	0.125	0.100	0.101	−0.029	0.052	0.004	0.018
	(0.780)	(0.000)	(0.000)	(0.000)	(0.000)		(0.203)	(0.306)	(0.303)	(0.765)	(0.599)	(0.965)	(0.852)
RD_TA	0.290	0.158	0.311	0.144	0.164	0.198	1	−0.056	0.375	0.165	0.094	0.180	0.168
	(0.003)	(0.107)	(0.001)	(0.141)	(0.094)	(0.042)		(0.565)	(0.000)	(0.090)	(0.340)	(0.065)	(0.085)
Size	0.020	0.026	0.097	0.202	0.151	0.089	−0.079	1	−0.057	0.078	0.414	−0.036	−0.112
	(0.836)	(0.794)	(0.325)	(0.038)	(0.122)	(0.362)	(0423)		(0.559)	(0.427)	(0.000)	(0.711)	(0.252)
Industry	0.220	0.059	0.078	0.088	0.075	0.093	0.552	−0.045	1	0.396	0.223	−0.199	0.058
	(0.023)	(0.550)	(0.428)	(0.368)	(0.444)	(0.345)	(0.000)	(0.648)		(0.000)	(0.021)	(0.041)	(0.553)
Lifecycle	−0.016	−0.033	−0.071	−0.007	0.016	−0.026	0.144	0.116	0.396	1	0.229	−0.230	0.299
	(0.873)	(0.736)	(0.467)	(0.942)	(0.870)	(0.789)	(0.140)	(0.236)	(0.000)		(0.018)	(0.018)	(0.002)
Patent	0.308	−0.044	0.049	0.025	−0.008	−0.004	0.493	0.329	0.496	0.353	1	−0.048	0.079
	(0.001)	(0.653)	(0.615)	(0.801)	(0.933)	(0.964)	(0.000)	(0.001)	(0.000)	(0.000)		(0.622)	(0.424)
Time	0.125	0.053	0.053	−0.003	0.069	0.036	0.177	−0.132	−0.165	−0.350	−0.098	1	0.031
	(0.202)	(0.592)	(0.591)	(0.975)	(0.484)	(0.712)	(0.069)	(0.176)	(0.092)	(0.000)	(0.317)		(0.749)
Performance	0.075	0.015	0.078	0.057	−0.004	0.053	0.393	−0.113	0.141	0.282	0.150	−0.041	1
	(0.445)	(0.880)	(0.425)	(0.560)	(0.967)	(0.592)	(0.000	(0.250)	(0.148)	(0.003)	(0.125)	(0.675)	

Notes: Pearson (Spearman) correlation coefficients are above (below) the diagonal. Variables are as defined in the notes of Table 2. Two-tailed *p*-values are in parentheses.

Table 5
Regression results of the relation between accountants' activities and NPD performance.

	NPD Performance (Performance)					
	Model (1)			Model (2)		
	Standardized			Standardized		
Variables	coefficients	*p*-value	VIF	coefficients	*p*-value	VIF
Intercept		0.068*			0.135	
Basic	−0.045	0.832	5.010	−0.173	0.389	5.244
Cost_planning	−0.025	0.904	4.999	−0.356	0.102	6.058
Cost_control	0.231	0.183	3.326	0.227	0.176	3.612
Profit	−0.038	0.840	3.962	0.351	0.082*	5.197
Risk	−0.043	0.827	4.271	0.126	0.508	4.641
RD_TA	0.146	0.191	1.381	0.208	0.056*	1.494
Size	−0.217	0.053*	1.379	−0.180	0.109	1.608
Lifecycle	0.338	0.002***	1.320	0.193	0.081*	1.562
Industry	−0.167	0.151	1.497	−0.209	0.068*	1.671
Patent	0.113	0.310	1.386	0.188	0.090*	1.571
Time	0.047	0.645	1.178	−0.006	0.955	1.234
Strategy				−0.060	0.544	1.273
Strategy * Basic				0.401	0.045**	5.047
Strategy * Cost_planning				0.817	0.000***	6.350
Strategy * Cost_control				−0.178	0.272	3.372
Strategy * Profit				−0.745	0.000***	5.472
Strategy * Risk				−0.342	0.086*	5.071
F−value	1.675*			2.490***		
Adj. R^2	0.066			0.194		

Notes: Variables are as defined in the notes of Table 2. ***, **, * indicate two-tailed significance at the 1%, 5%, and 10% levels, respectively. Performance: sales from new products over total sales. Model 1 and Model 2 represent the regression without and with interaction terms of strategy and accountants' activities in NPD, respectively

performance under different strategies. We investigate whether the cost leadership sample with greater focus on cost control obtains better NPD performance. Table 6 reports the results.

The results of the differentiation strategy show that the coefficient of *Cost planning* is positive and marginally significant (0.440, *p-value* = 0.078). This indicates that if accountants in companies adopting the differentiation strategy prioritize planning and analyzing cost information at an earlier stage of the NPD process, then the targets for product function, product quality, and product cost can be achieved. Relevant activities include providing cost information related to current products and different departments, computing the cost of capital required to develop new products, estimating the lifecycle costs of new products, setting cost targets for new products and decomposing the targets, participating in the design and maintenance of the cost table, providing cost information related to new products that are still at the development stage, analyzing how product costs vary with product design, providing relevant cost information from make-or-buy analyses, and preparing budgets for the new products.

Turning to the results of the cost leadership strategy, we find a positive and marginally significant relationship between *Cost control* and *Performance*, which supports H3. This indicates that accountants in companies using the cost leadership strategy emphasize the management and control of cost evaluation at a later stage in the development of new products. To improve NPD performance, accountants tend to concentrate on activities such as providing progress reports on the status of achieving cost targets and analyzing the reasons for variances, providing financial data using process improvement analyses, analyzing the costs and benefits of each proposal, providing suggestions for cost improvements, and setting the cost standards for products. These activities improve the operational efficiency and cost management of companies using the cost leadership strategy, which can in turn enhance their NPD performance. The lack of significance on the interaction term of Strategy*Cost_control in Table 5 also indicates that differentiators with more focus on cost_control activities do not obtain inferior NPD performance.

The significantly positive coefficient of *Profit* also indicates that, for companies using the cost leadership strategy, accountants should focus more on the profit analyses of new product portfolios, on the analyses of the impact of capital expenditure on tax and the preparation of budgets for capital expenditure, on the assistance in interpreting financial data, and the preparation of product reports, all of which can help these companies maintain cost competitiveness and result in better NPD performance. For the group of companies with the cost leadership strategy, we find that the electronics industry has less NPD performance.

Overall, the findings in Table 6 are consistent with H4 and provide marginal support for H2 and H3. That is, to improve NPD performance, companies using the differentiation strategy should emphasize cost planning activities, while those using the cost leadership strategy should focus on cost control activities and profit management activities.

Table 6
Analyses of the importance of accountants' activities for different strategies.

	NPD Performance (Performance)			
	Differentiation strategy (n=56)		Cost leadership strategy (n=50)	
Variables	Standardized coefficients	p-value	Standardizedcoefficients	p-value
Intercept		0.800		0.076*
Basic	0.411	0.122	−0.500	0.108
Cost_planning	0.440	0.078*	−1.304	0.005***
Cost_control	0.031	0.893	0.449	0.067*
Profit	−0.530	0.026**	0.982	0.010***
Risk	−0.271	0.313	0.468	0.120 #
RD_TA	0.184	0.198	0.271	0.132
Size	0.001	0.994	−0.276	0.107
Lifecycle	0.279	0.077*	0.167	0.335
Industry	0.124	0.422	−0.440	0.012**
Patent	−0.033	0.871	0.270	0.091*
Time	0.092	0.499	−0.015	0.921
F−value	2.413**		2.295**	
Adj. R^2	0.220		0.225	

Notes: Variables are defined in the notes of Table 2. ***, **, * indicate two-tailed significance at the 1%, 5%, and 10% levels, respectively. Performance: sales from new products over total sales.

4.4. Additional analyses and robustness tests

This paper measures firm strategy from the questionnaire. We next test the robustness of our main results to the use of the alternative objective measure of firm strategy. Following prior literature, we use the average ratios over the previous three years of R&D intensity, marketing expense to sales, and market-to-book (Chong & Chong, 1997; Hambrick, 1983; Ittner et al., 1997; Said et al., 2003), We obtain the composite index of strategy through the factor analysis and factor loadings of these three variables. We divide firm strategy into differentiators and cost leaders according to the median of the composite index of strategy. The firms are classified as differentiators (cost leaders) when their composite index is greater (less) than the median. Table 7 reports the results from the alternative objective measure of strategy and accountants' activities on NPD performance. The results support H2 and marginally support H3 and H5. Table 7 shows the results of cost planning activities and risk management activities are generally consistent with those in Table 5, except for the interaction terms for basic activities and profit activities.

We further measure sales from new products as the alternative proxy for NPD performance to verify the robustness of our results.[14]

[14] In the main analysis section, we follow prior studies and use the ratio of sales from new products to total sales as a proxy for NPD performance (Cooper & Kleinschmidt, 1993; Hopkins, 1981; Song & Parry, 1996). To estimate absolute amounts of new product sales, we multiply total sales by our original proxy for NPD performance: the ratio of sales from new products to total sales.

Table 7
Regression results of the relation between accountants' activities and NPD performance (Based on objective strategy).

	NPD Performance (Performance)					
	Model (1)			Model (2)		
	Standardized			Standardized		
Variables	coefficients	*p*-value	VIF	coefficients	*p*-value	VIF
Intercept		0.068*			0.148	
Basic	−0.045	0.832	5.010	−0.071	0.735	5.207
Cost_planning	−0.025	0.904	4.999	0.013	0.952	5.381
Cost_control	0.231	0.183	3.326	0.162	0.357	3.690
Profit	−0.038	0.840	3.962	0.118	0.532	4.288
Risk	−0.043	0.827	4.271	−0.088	0.647	4.456
RD_TA	0.146	0.191	1.381	0.100	0.408	1.730
Size	−0.217	0.053*	1.379	−0.222	0.047	1.463
Lifecycle	0.338	0.002***	1.320	0.311	0.004*	1.357
Industry	−0.167	0.151	1.497	−0.179	0.131	1.653
Patent	0.113	0.310	1.386	0.149	0.182	1.478
Time	0.047	0.645	1.178	0.057	0.570	1.197
Strategy				−0.003	0.980	1.623
Strategy * Basic				0.186	0.363	5.008
Strategy * Cost_planning				0.666	0.002***	5.187
Strategy * Cost_control				−0.298	0.083*	3.497
Strategy * Profit				−0.268	0.159	4.305
Strategy * Risk				−0.351	0.069*	4.370
F−value	1.675*			1.918**		
Adj. R^2	0.066			0.129		

Notes: Objective strategy is measured by the composite index of R&D to sales ratio, marketing expense to sales ratio, and market-to-book ratio. Firms with a composite index that is higher (lower) than the median of this index are classified as differentiators (cost leaders). Objective strategy is equal to 1 for the differentiation strategy, and 0 for the cost leadership strategy. Other variables are as defined in the notes of Table 2. ***, **, * indicate two-tailed significance at the 1%, 5%, and 10% levels, respectively. Performance is measured as sales from new products over total sales. Model 1 and Model 2 represent the regression without and with interaction terms of strategy and accountants' activities in NPD, respectively.

Table 8
Regression results of the relation between accountants' activities and NPD performance (New product sales).

	NPD Performance (Performance)					
	Model (1)			Model (2)		
	Standardized			Standardized		
Variables	coefficients	*p*-value	VIF	coefficients	*p*-value	VIF
Intercept		0.003***			0.001***	
Basic	−0.050	0.634	5.114	−0.110	0.274	5.311
Cost_planning	0.099	0.344	5.074	0.006	0.958	6.104
Cost_control	0.039	0.638	3.304	−0.014	0.862	3.593
Profit	0.031	0.736	3.917	0.165	0.096*	5.095
Risk	−0.090	0.345	4.251	−0.008	0.932	4.622
RD_TA	0.002	0.964	1.394	0.031	0.567	1.504
Size	0.182	0.001***	1.388	0.214	0.000***	1.612
Lifecycle	−0.034	0.530	1.352	−0.079	0.153	1.600
Industry	−0.122	0.035**	1.542	−0.095	0.098*	1.711
Patent	0.814	0.000***	1.389	0.816	0.000***	1.570
Time	0.000	0.995	1.178	−0.001	0.986	1.235
Strategy				−0.085	0.086*	1.259
Strategy * Basic				0.284	0.005***	5.117
Strategy * Cost_planning				0.158	0.154	6.338
Strategy * Cost_control				−0.013	0.875	3.357
Strategy * Profit				−0.311	0.003***	5.434
Strategy * Risk				−0.065	0.509	5.062
F−value	34.545***			26.036***		
AdjR^2	0.782			0.805		

Notes: variables are as defined in the notes of Table 2. ***, **, * indicate two-tailed significance at the 1%, 5%, and 10% levels, respectively. New product sales is measured by an estimate of the absolute amount of new products sales. Model 1 and Model 2 represent the regression without and with interaction terms of strategy and accountants' activities in NPD, respectively.

We use absolute amounts of new product sales to verify the robustness of our results. Table 8 reports the interactive effect of firm strategy and accountants' activities on estimated new product sales. The results of both Strategy*Basic and Strategy*Profit are significant at the 0.01level. The coefficient of Strategy *Cost planning is positive but not significant. The coefficients on the interaction term of strategy and cost control (Strategy *Cost_control) and the interaction term of strategy and risk management activities (Strategy *Risk) are insignificant. This implies that, compared to differentiators, companies with cost leadership strategies emphasizing cost control and risk management activities do not obtain better absolute amounts of new product sales. One possible explanation is that cost leadership strategies emphasize cost control, trend monitoring and efficiency rather than scanning the environment for new opportunities (e.g., Simons, 1987). Thus, firms with cost leadership strategies focusing more on both cost control and risk management are not able to obtain higher absolute amounts of new product sales.

To further evaluate the perceived importance of different aspects of activities for different strategies, we report summary statistics of the five types of accountant's activities for the differentiation and cost leadership strategies in Table 9. The difference in the median values of basic activities and profit management activities between differentiation and cost leadership strategies are marginally significant at the 10% level. We do not find significant differences in cost control, cost planning, or risk management activities between the differentiation and cost leadership strategies. This implies that compared to differentiators, companies with a cost leadership strategy pay more attention to basic activities and profit management.

Those who took part in this survey are mainly managers who have knowledge of the accounting process even though they work in such varied departments as finance, accounting, administration and management. For robust results, we examine the hypotheses by the responses from the 82 financial and accounting officials. The untabulated results support H1, H2, and H4 at two-tailed significance. That is to say, the nature of the survey respondent's department does not affect our results.

Finally, we look exclusively at responses from representatives working in the electronics industry. The results are shown in Table 10, and are qualitatively similar to the full sample results reported in Table 5. Hence, our conclusions are relevant to the electronics industry.

To assess the validity of our results in the current economic and business environment, we conducted in-depth interviews with three senior financial officials from three listed firms. We ascertained the following from these interviews. First, the tasks of the accountant mentioned in this survey are applicable under present circumstances, and they are applied to the development of new products, which are increasingly valued. Second, although technological advances enable the companies in precision machinery industry to be more efficient in the developmental stage of their products, the work method remains the same in spirit.

5. Conclusion and managerial implications

There has been an increased interest in exploring the association between firm strategy, accountants' activities, and NPD performance. We investigate the activities carried out by accountants to aid NPD and in achieving strategic goals. Extending prior research (Sandino, 2007), this study identifies five categories of accountants' activities: basic activities, cost planning activities, cost control activities, risk management activities, and profit management activities. We hypothesize that the choice of activities among these categories reflects the firms' strategy, and that firms in which accountants' activities are better suited to firm strategy perform better than others. The results indicate that adopting a differentiation strategy with a focus on cost planning activities is

Table 9
Analyses of the importance of accountants' activities for different strategies.

	Differentiation strategy (n=56)			*Cost leadership strategy* (n=50)				
Accountants' Activities	Mean (1)	Median (2)	Stdev	Mean (3)	Median (4)	Stdev	Difference in Mean (1)--(3)	Difference in Median (2)--(4)
Basic	3.749	3.674	0.605	3.852	3.979	0.585	−0.103 (−0.890)	−0.305* (−2.637)
Cost_planning	3.868	3.91	0.474	3.936	3.92	0.537	−0.068 (−0.688)	−0.01 (−0.101)
Cost_control	3.78	3.826	0.571	3.966	4	0.547	−0.186 (−1.712)	−0.174 (−1.601)
Profit	3.836	3.752	0.619	3.883	3.976	0.529	−0.047 (−0.421)	−0.224* (−2.008)
Risk	3.792	3.876	0.543	3.814	3.752	0.594	−0.022 (−0.198)	0.124 (1.117)

Notes: Variables are as defined in the notes of Table 2. The t-statistics are presented in parentheses. * indicates significant difference of individual activity between differentiation strategy and cost leadership at the 10% level (two-tailed test).

associated with better NPD performance. At the same time, the cost leadership strategy combined with an emphasis on profit management can improve performance of NPD.

Our results can add empirical evidence to contingency theory, which views corporation strategies as an important contingency variable in MCS (Chenhall, 2003; Simons, 1987, 1990). The findings of our study thus imply that an appropriate fit between strategy and accountants' activities improves NPD performance. The relationship between accountants' activities and NPD performance is contingent upon certain strategic characteristics. For companies adopting a differentiation strategy, the speed of generating new products dictates that the accountants should be more focused on the management of basic operations, the establishment of plans and standards, and the support of basic operations (e.g., providing information on relevant regulations, analyzing whether NPD is in compliance with tax incentive conditions, evaluating performance, cooperating and communicating among NPD team members, and compiling and sharing information). As innovation in product design is an essential element, accountants should spend more time in the planning and analysis of cost information at an early stage, to ensure that both cost management and customers' needs are taken into consideration in the development of new products. On the other hand, accountants in companies adopting a cost leadership strategy should spend more time on managing the elements of profit management activities such as profit analyses of new product portfolios, giving assistance in interpreting financial information, analyzing the effect of capital expenditures on tax, and preparing capital expenditure budgets and product reports. Moreover, risks may influence firms' operational efficiency and undermine their cost competitiveness. Thus, under the cost leadership strategy, accountants should focus on performing risk management activities (e.g., knowing the industrial environment in which the company operates, analyzing the feasibility of NPD, providing information on exchange rate changes, designing and maintaining the accuracy and security of data systems, and assessing the financial position of the company's suppliers) to help companies reduce risk.

Our empirical results are relevant globally. For example, there are over 40 Taiwanese companies in Google's supply chain, including Compal Electronic, Inc., Wistron, and Inventec Corporation. Our findings suggest expanding the role of accountants in innovative settings, and adoption of a control paradigm in which directing accountants' activities to strategic goals is viewed not as a hindrance but as beneficial to innovation. Based on the results of the importance of each type of activity under the different strategies, we find that companies using the differentiation strategy put relatively less emphasis on basic and cost planning activities than do those using the cost leadership strategy. The influence of accountants' activities on NPD performance varies with the adopted strategy. Our results provide incentive for companies to reevaluate the appropriateness of their resource allocation. As companies face limited resources, they should concentrate on those activities carried out by accountants that will lead to better NPD performance. Moreover, when reevaluating their emphasis, companies should also consider whether the activities performed by accountants can be adjusted in order to implement their strategy effectively.

Our study is subject to several limitations. As we rely on questionnaires to obtain data on the activities performed by accountants in the development of new products, our results may be subjective. Moreover, it is difficult to determine how accountants actually perform their activities and the specific differences in these activities between companies using the differentiation and cost leadership strategies. Future research might conduct an experiment with a suitable task involving experienced accountants and non-accountant managers to examine how managers actually perform their activities and the specific differences in these activities for NPD between companies using the differentiation and cost leadership strategies. In addition, prior studies indicate that national culture can affect the implementation of a management control system and employees'

Table 10
Regression results of the relation between accountants' activities and NPD performance in the electronics industry.

	NPD Performance (Performance)			
	Standardized		Standardized	
Variables	coefficients	*p*-value	coefficients	*p*-value
Intercept		.157		.420
Basic	−.057	.852	−.288	.335
Cost_planning	.139	.644	−.224	.561
Cost_control	.031	.910	.131	.668
Profit	−.103	.709	.445	.145
Risk	−.040	.884	.048	.859
RD_TA	.196	.173	.213	.128
Size	−.155	.375	−.082	.625
Lifecycle	.153	.339	.119	.458
Patent	.140	.393	.176	.347
Time	−.308	.054*	−.277	.066*
Strategy	−.057	.157	.037	.814
Strategy * Basic			.737	.020*
Strategy * Cost_planning			.848	.077*
Strategy * Cost_control			.016	.961
Strategy * Profit			−1.033	.002*
Strategy * Risk			−.572	.033*
F-value	1.265		2.171**	
Adj. R^2	0.041		0.232	

Notes: Variables are as defined in the notes of Table 2. **, * indicate two-tailed significance at the 5% and 10% levels, respectively. NPD performance is measured as sales from new products over total sales.

attitudes (Birnberg & Snodgrass, 1988; Etemadi, Dilami, Bazaz, & Parameswaran, 2009; Lau & Caby, 2010). Thus, the conclusions of this study may not be generalizable to different contexts. Despite these limitations, we believe that the evidence of this study provides important insights into the relationship between accountants' activities and NPD performance, which depends on properly matching accountants' activities to firm strategy.

Declaration of Competing Interest

The authors have no conflict of interest in this regard.

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