



Costing to support strategy for new product development: a study of practice in large international companies

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Abstract

The aim of this study is to examine the relationship between strategies to invest in new product development (NPD) and target costing (TC) and life cycle costing (LCC) usage, how companies use TC to align strategy and NPD and why companies adopt TC in their specific practices. The study conducts qualitative interviews with seven selected large international organizations based in Europe and the United States and operating in Italy in different industries. The interview results show that TC is used across the all seven international organizations to support strategy to invest in NPD and that few companies tend to use LCC information to support decision-making. While TC is used as both a performance measurement and strategic management tool, it appears that international organizations adopt TC for cost reduction during the research, development and engineering (RD&E) cycle in order to be more competitive. Although significant progress has been made over the last two decades in describing strategic cost and management accounting practices, the contributions of this study to the accounting literature involve both research content and design. In particular, having identified gaps in previous accounting research, we design a study focused on the practice of large international companies and adopt a qualitative method.

Keywords: Qualitative method, product development strategy, life cycle model, target costing, life cycle costing, interviews.

1. Introduction

The field of strategy and accounting continually evolving. Johnson et al. (2014, p.3) define strategy as “the long-term direction of an organization”¹. Leading management accounting and control theorists provide an interesting framework to support strategy (e.g., Atkinson et al., 2012; Simons, 2014). In this context, strategic management accounting (SMA) plays a key role in strategic management (SM) because it provides both qualitative and quantitative internal information for decision-making and strategy execution, as well as information about the business environment. Bromwich and Bhimani (1994, p. 127) suggest that “Providing a strategic perspective in management accounting requires the role of accounting to be extended in two directions. It first requires that costs are integrated into strategy using a variety of strategic cost analyses. The aim is to align costs with strategy. The second element of strategic management accounting is to discover in a fairly general way the cost structure of competitors and to monitor changes in these over time”.

The main motivation of the present study is to contribute to the accounting literature and, in particular, to inform practitioners about large international companies’ practices on costing techniques to support strategy to invest in NPD as a type of growth direction for an organization.

Using interviews with senior corporate accountants, this study aims to examine and interpret the relationship between strategy to invest in NPD and TC and LCC usage, to assess whether TC develops value engineering (VE) and tear-down (TD) approaches in new product design, to

¹ For a comparison of strategy definitions, see Chandler (1963), Porter (1996), and Minzberg (2007).

determine how companies adopt TC to align strategy and NPD and why companies adopt TC in their specific practices.

The paper comprises six sections. The next section briefly explores the life cycle model, focusing on the cost curves of the entire life cycle of new products, the relationship of functional life cycle concepts and their typical strategic costing techniques. In section three, a set of propositions is carefully developed to focus the main purpose of the study. Section four describes the research method. Section five describes the interview results and organizes the interpretation. The paper concludes with a discussion and the study's limitations, and presents potential avenues for future research.

2. What is the life cycle model?

The strategy literature suggests that NPD, especially in the form of product innovations, can be a prerequisite for remaining competitive in a dynamic and technological business environment. Furthermore, corporate strategy for product development is a type of growth direction for an organization.

The accounting literature, consistent with the above objective, notes that the strategy to invest in NPD requires alignment between strategy and accounting² and traces, through strategic management accounting (SMA), the framework for supporting strategic decisions (see Simmonds, 1981)³. In brief, what are the main characteristics of the SMA framework? SMA emphasizes a long-term focus and requires future internal financial and non-financial information, both qualitative and quantitative, as well as financial and non-financial information about the environment in which the company operating. In this context, the accounting literature proposes new concepts in cost analysis that explicitly consider strategic issues (for example, see Shank and Govindarajan, 1989). The strategic costing⁴ literature contains an interesting contribution by Atkinson et al. (1997), who provide a life cycle model (LCM) as an organizing framework for managing and measuring cost and quality. LCM plays a key role in aligning cost and strategy and provides information for managers looking to understand the total life cycle costs of a product or service.

Within this organizing framework, we focus our empirical study on some product costs that the company incurs before the manufacturing process and calculate the life cycle costs for a new product for the purpose of measuring and managing. Once the area of interest has been delimited, we examine the practical implication of new product projects and explain how TC, and implicitly LCC, help researchers and engineers make product design decisions to meet customer's expectations at a desired cost.

The Ansoff product/market grow matrix (1988) is a corporate strategy framework for generating four basic directions for the company. In this framework one possible direction for organizational growth is product development (see Figure 1).

INSERT FIGURE 1 ABOUT HERE

² See Davila (2000) for a study that seeks to explore the drivers of management control systems design in new product development.

³ See Busco, Caglio and Scapens (2015) for a discussion on the adoption of management accounting innovations and highlight the potentials offered by the literature.

⁴ For example, see Cinquini and Tenucci (2010) and Cravens and Guilding (2001) for a classification and a description of the strategic costing techniques.

The implication of corporate strategy for product development is that it can create potential future benefits for competition. However, this type of growth direction is often a very expensive, high risk activity that requires new strategic capabilities, and involves project management risk management and an accurate capital investment process to evaluate performance. Between the several stages of the investment process a specific analysis of the life cycle costs (and revenues) is essential. Indeed, in managing new products, the cost curves of the entire life cycle are complex. Figure 2 shows the cost curves of the entire life cycle of a new product and service.

INSERT FIGURE 2 ABOUT HERE

Furthermore, an analysis must consider the different functional life cycle concepts over the life cycle.

Let us now look at the well know comments provide by Atkinson et al. (1997, p. 609). "Given the rapid development of new products and shorter product life cycle, some organizations have developed a more comprehensive approach to product costing, which we call total-life cycle costing [---] From the manufacturer's perspective, total-life cycle product costing integrates these functional life cycle concepts: research, development and engineering, manufacturing and post-sale service and disposal".

These three functional life cycle concepts, which define three stages, are related to specific strategic costing techniques. Relevant techniques are TC, LCC and kaizen costing⁵ (see Figure 3).

INSERT FIGURE 3 ABOUT HERE

Considering our area of interest, a comprehensive costing to support strategy for NPD during the RD&E stage, we focus primarily on TC and implicitly on LCC.

3. Development of research propositions

In the literature, TC, which was developed by Japanese engineers in the 1960s, is treated as a market-oriented strategic cost technique. What is the reason for its adoption, especially in large Japanese firms that operate in global market? Bromwich and Bhimani (1994, p. 174) suggest, "The major role of management accounting in Japan can be considered to be that of aiding the pursuit of the enterprise's objectives especially in the area of cost reduction". Cooper (1996, p. 242) notes that "Target costing is applied during the design stage of the product life cycle. It achieves its cost reduction objective primarily through improvement in product design".

Here, a practical and critical implication for the companies that use TC is the relationship between the type of competitive environment (increasing or stable) and the type of product technology (growing or maturity). In particular, an increasing competitive environment with growing product technologies involves improvement (or innovation) in product design during the RD&E cycle and the use of TC, with financial and non-financial information, in order to satisfy emerging customer needs and reduce product design and development costs. In addition, limited cost improvement can be realized with an efficient production process during the manufacturing cycle and the use of kaizen costing.

⁵ Atkinson et al. (2012, p. 297) note that "Kaizen costing focuses on reducing cost during the manufacturing stage of a product. Kaizen is the Japanese term for making improvement to a process in small, incremental amounts rather than through large innovation".

There are a number of good descriptions of TC (for example, see Kato, 1993). In brief, TC can be defined as a method of cost planning, oriented to avoid costs of failed projects used during the research, development and engineering (RD&E) cycle of the PLC. The RD&E cycle is critical because a company incurs committed costs. Bromwich and Bhimani (1994, p. 191) note that “A large portion of the funds commitment takes place during the product conception phase whilst 80 percent of expenditures are determined prior to the start of production, depending on the industry”.

Let us look at the research propositions.

A relevant question in this study is whether the investment analysis process in practice is based on financial and non-financial information and whether companies align cost to strategy using TC and LCC as strategic costing techniques to support a strategy of investing in NPD.

Why are these questions important? First, empirical accounting research often assumes that strategy development is based on financial and non-financial information to support strategic action (e.g., Kaplan and Norton, 2001). In general, product development is typically subject to new investment proposals that incorporate risk and impact on costs (and revenues) over a number of years in the future. The project evaluation is significantly different in the manner in which the company justifies investment. Typically, the main approaches are: (1) costs and benefits (tangible and intangible) quantified financially; (2) strategic consideration, such as technical importance, competitive advantage, business objectives, research and development, prevailing financial consideration; and (3) a combination of strategic and financial considerations. Product development involves investment decision techniques,⁶ especially in relation to strategic financial expenditures (e.g., acquiring new technologies and marketing capability), as well as non-financial expenditures (e.g., safety, environmental or legislative requirements). Given the importance of substantial expenditures, one purpose of this research is to examine whether financial and non-financial information is of equal importance in the practices of large international companies in regard to supporting corporate strategy to invest in NPD⁷. Second, empirical research concerned with the use of costing techniques has focused on identifying the types of cost management practices developed to manage and measure the cost of existing products and costing techniques to support a strategy for new (future) products. (for example, see Cooper’s study in Japan, 1996). Given the centrality of product development, this study also seeks to develop an understanding of whether TC and LCC, as strategic costing techniques that require financial and non-financial information, are equally important in the practices of large international companies to support strategy to invest in NPD as a specific type of growth direction of an organization. These considerations lead the following propositions (P):

P1: New product development tends to use financial and non-financial information rather than only financial information.

P2: Target costing is more important than life cycle costing for new product development.

P3: Target costing tends to develop value engineering and tear-down analysis approaches in new product design.

4. Research method

4.1 Qualitative method

⁶ Strictly, investment decision techniques are based on (traditional or sophisticated) financial analysis, non-financial investment criteria, and risk analysis.

⁷ See, for a similar approach, Bhimani and Langhfield-Smith, 2007.

The research design used a qualitative method (for example, see Creswell 2014). Interviews were designed to incorporate practitioners' knowledge insights into the practice of large international companies in the area of strategic cost and management accounting. The choice to employ a qualitative method and interpret the interviews was mainly motivated by the in-depth information provided by the distinctive competences of senior corporate accountants and their participation in strategic decision-making processes.

4.2 Sampling procedures

The target population included large international companies that differ by country of origin, industry and size. The database, obtained from the Italian Industry, Commerce, and Agriculture Confederation (CCIAA), contains contact information, industry classifications, and financial figures, but does not provide the names of senior corporate accountants. Thus, they were identified by sending a letter to a selected set of manufacturers operating in Italy. The letter sent by e-mail explained the objectives of the research, asked whether there was interest in participating in the project and requested the respondents' names and e-mail addresses. Seven international companies agreed to participate to the e-mail internet interviews. The sample comprises four countries of origin: Italy, Sweden, Germany and the United States. Information on large international companies covered in the interviews is presented in Table 1.

INSERT TABLE 1 ABOUT HERE

Among the main different characteristics of the seven companies involved in the study, as indicated in section five, there are the ownership models (public companies and family businesses) and equity markets (listed and non-listed). These differences, including governance models, are important because they often influence strategy.

4.3 Variables in the study

In this study, the interview data focused mainly on the following variables: (a) product development, (b) financial and non-financial information, (c) target costing, (d) value engineering and tear-down analysis approaches and, (e) life cycle costing. Prior to developing the e-mail internet interviews, a glossary of terms was provided to respondents.

Product development

"Product development is where organisations deliver modified or new products (or services) to existing markets. [...] Despite the potential for benefits from relatedness, product development can be expensive and high-risk activities" (Johnson et al., 2014, p. 229).

Financial and non-financial information

"The planning of performance may be improved if non-financial information is utilized together with financial information. This is especially helpful where some costs may be difficult to define and to measure though a wide array of real time non-financial information is available" (Bromwich and Bhimani, 1994, p. 12-13). In general, a balanced scorecard represents a framework that combines financial and non-financial information. "The mix of financial and non-financial measures and their cause-effect relationships is designed to combat the short-termism fostered by traditional accounting measures" (Norreklit and Mitchell, 2007, p. 178).

Target costing

“Target costing focuses on cost reduction during the research, development and engineering cycle” (Atkinson et al., 1997, p.608). During the RD&E cycle the customer’s needs are assessed and the new products are designed and developed following three stages: (1) market research, (2) product design, and (3) product development. “A product’s target cost is determined by subtracting its target profit margin from its target selling price. That is: target cost = target price – target margin” (Cooper, 1996, p. 237).

Value engineering

“Value engineering, also known as value analysis, is a systematic, usually team-based, approach to evaluating a product’s design in order to identify alternatives that will improve the product’s value – defined as the ratio of functionality to cost. Therefore, there are two ways to improve value: hold functionality constant and reduce cost, or hold cost constant and increase functionality. Value engineering looks at all of the product’s elements, including the raw materials, the manufacturing process, the type of labour and equipment used, and the balance between purchased and self-manufactured components” (Kaplan and Atkinson, 1998, p. 228).

Tear-Down Analysis

“Tear-down and value engineering approaches focus mainly on the product design” [...] Tear-down analysis provides insight into the cost of the product and suggests the relative advantages and disadvantages of the competitor’s approach to product design. The major element of tear-down analysis is benchmarking, which involves comparing the tentative product design with the designs of competitors” (Kaplan and Atkinson, 1998, p. 227-228).

Life Cycle Costing

“Life cycle costs refer to all the costs that the producer will incur over the product’s life cycle, including design, manufacturing, marketing, logistics, and service” (Shield and Young, 1991, p. 39). Similar criteria suggest that the term life cycle costing involves “the appraisal of costs based on the length of stages of a product or service’s life. These stages may include design, introduction, growth, maturity, decline and eventually abandonment” (Cadez and Guilding, 2008, p. 857).

4.4 Interviews: first and second stages

In the first stage, the interviews that are relate with the three propositions (P) asked respondents the following list of questions (Q):

Q1: What does the company do, and what are the principal strategies to invest in product development?

Q2: To what extent are these strategic activities based on financial and non-financial information?

Q3: To what extent are these strategic activities based on target costing and life cycle costing?

Q4: Do value engineering and tear-down analysis approaches play a role in new product development?

In the second stage, the interviews asked respondents to integrate the previous analysis with the following two questions (Q):

Q5: How do companies use target costing to align strategy and new product development?

Q6: Why do companies adopt target costing, in their specific practices, to support new product development strategy?

Interviewees were encouraged to describe each question in a specific section of the e-mail internet interview, and conclude their comments adopting a dichotomous scale.

5. Results

5.1 Interview results of the first stage and their interpretation

Interview results of the first stage, including an interpretation of the raw data collected with the responses to questions Q1 to Q4, clarify the use of financial and non-financial information, as well as the use of TC and LCC to support strategic activities on product development and the VE and TD usage. These interview results, structured in a form of template, are analysed and discussed below.

5.1.1 Company A

Company A, an Italian organization, is a public and listed company pursuing a global strategy in the automotive industry. The different strategic business units (SBUs) operate in private-sector markets that are exposed to an increasing competitive environment in a growing product technology with a medium to long length of PLC (6-7 years).

On the questions concerning use of financial and non-financial information to support corporate strategy to invest in NPD, the Head of Investment and Platform Controller explained that:

“Financial information is mainly driver for the product strategy development. Moreover, sometimes it could happen that for strategic reasons investment (in new products) is performed even if it will be not profitable from a financial stand point”[...]. “The new product development (NPD) is decided based on a net present value (NPV) analysis that is included in a specific business case. A business case exists for each new product investment . In the BC (business case) finance performs different activities/tasks by: (i) integrating commercial parameters with product and process cost to obtain financial KPIs; (ii) evaluating alternative scenarios of manufacturing footprints, engineering options and product grid; and (iii) giving several sensitivity alternative scenarios.”

In terms of the extent to which strategic activities to invest in NPD are based on TC and LCC, the interviewee noted that:

“During the product planning phase, a specific Cost Engineering Department elaborates different loops of analysis to determine the target cost of the (new) products. The current definition of the cost represents a milestone in the product planning process that is fundamental for the future of the project”.

This is indicative of the role of TC in NPD decision-making. In consideration of the medium-long PLC, Company A assumes the use LCC information for decision-making to be unpractical and unrealistic. Therefore, using the product technology/competitive environment framework is very important, especially the use of target costing during the planning phase as a method for reducing

cost through the product design. In an international company operating in a highly competitive environment where product (and process) technologies change rapidly, the implication is the use of kaizen costing during the manufacturing cycle for a limited improvement of the production process's costs by increasing efficiency.

In relation to the use of VE and TD analysis approaches, the interviewee notes that:

“The method of target costing is consolidated in the Cost Engineering Department and the company after the result of a target costing, and focuses on appraisal of any new products through the value engineering process”.

Why only the VE approach? For the characteristics of Company A, the VE process is fundamental in order to evaluate the product design, identify alternatives that will improve the product's value, and review all of the product's elements. In our interpretation, Company A assumes the internal innovation capacity rather than invest financial resources for a cross-analysis (tear-down approach).

5.1.2 Company B

Company B, an Italian organization, is a public and listed company pursuing a multi-domestic strategy in the telecommunication sector. Different SBUs operate in private-sector markets (Europe, South America and the Mediterranean Basin). These are exposed to an increasing competitive environment in a growing product technology with short length of PLC (1-2 years).

On the questions regarding the use of financial and non-financial information to support corporate strategy to invest in NPD, the Head of Strategy Planning noted that:

“The decision to invest in NPD is always based on both financial and non-financial information; financial information certainly has a preponderant weight in choosing in regard to (the Company's) core business. When the choice is related a new product in adjacent markets, often embryonic, the assessment is heavily based on non-financial information even though it is inevitably accompanied by a complete business plan”.

In terms of the extent to which strategic activities to invest in NPD are based on TC and LCC, the interviewee explains that:

“Considering the NPD process previously described, some strategic decisions are taken regarding the costs” [...]. Target costing is determined during the new product planning phase”.

This is indicative of the role of TC in NPD decision-making. Company B assume that the continuous and rapid technological/service innovation is a key business strategy to stay competitive. Increasing a competitive environment requires new product development with growing product technology. The method of target costing primarily plays a central role for decision-making and strategy execution for cost reduction in the RD&E cycle. Internal product design is a strategic activity, and the usage of kaizen costing is secondary, especially because the company is external to the production process. Company B does not develop the LCC but uses the business plan as a simulation tool to determine cash flows for capital budgeting purposes. More emphasis is on strategic consideration.

In relation to the use of VE and TD analysis approaches, the interviewee notes that:

“(The company) is often a leader in innovation, and in that case tear-down analysis is not crucial. However, when it is not, and information is available, we perform reverse engineering activities. In addition, we have a start-up acceleration programme that gives us the opportunity to insource skills and ideas that help us to improve our services. Value engineering and value for money studies are systematically provided”.

5.1.3 Company C

Company C, a Swedish organization, is a public and listed company pursuing a global strategy in the home and professional appliances industry. Different SBUs operate in private-sector markets that are exposed to an increasing competitive environment in growing product technologies with a medium length of the PLC (5 years on average).

On the questions regarding the use of financial and non-financial information to support corporate strategy to invest in NPD, the Global Industrial Operation Controller suggests that:

“Decisions about NPD are fundamentally taken with financial information: cash flow, NPV, IRR, Pay back and profitability simulation of gross margin. Other aspects are considered, such as market share development, brand image, competition, but these are not crucial for a final decision”.

In terms the extent to which strategic activities to invest in NPD are based on TC and LCC, the interviewee noted that:

“We consider two cases: existing product and new products”. [...] “Target costing is used for new product projects (we call it top-down because it starts from price assumption and target margin definition). In parallel, we have a bottom-up cost calculation. There are loops to reconcile the two processes, requiring review of product specification and cost reduction techniques (tear down analysis)”

Additionally, in Company C, the role of TC in NPD decisions is relevant. In particular, it is interesting that the company adopts two parallel cost systems. While absorption costing is used to measure and manage the costs of an existing product, TC is consolidated at the business level for new products. In this increasing competitive environment with growing product technologies, the method of target costing primarily plays a central role in decision-making and strategy execution. The focus, for to stay competitive, is on cost reduction in the RD&E cycle. However, given the internal product design develop by the corporate department of research, kaizen costing is relevant for cost reduction during the manufacturing cycle. Considering the medium length of the PLC, Company C develops a form of LCC primarily to forecast the cash flows for capital budgeting purposes.

In relation to the use of VE and TD analysis approaches in NPD, the interviewee added that:

“The company determines target costing and uses value engineering and tear-down analysis”.

In summary, Company C stressed that it placed high emphasis on strategic cost analysis, as well as the use of TC, VE and TD analysis. Strategic consideration and financial analysis in strategy

decisions to invest in NPD are particularly considered.

5.1.4 Company D

Company D, a US organization, is a public and listed company pursuing a global strategy in the oil and gas industry. Different SBUs operate in private-sector markets that are exposed to an increasingly competitive environment in growing product technologies with a long length of PLC (8-9 years).

On the questions regarding the use of financial and non-financial information to support corporate strategy to invest in NPD, the Finance Manager argued that:

“We pursue five different strategies to invest in new product development or product portfolios improvement [...] and financial information is critical for go no-go decision” [...] A programme with negative NPV or non-attractive IRR will be put on hold unless driven by safety or other legislative requirements. On the other side the business case assumption is mainly linked to market, product and competition information. Both financial and non-financial information are important to drive NPD decisions”.

In terms of the extent to which strategic activities to invest in NPD are based on TC and LCC, the interviewee noted that:

“We use life cycle costing during the NPD planning phase to reduce costs (manufacturing process, sourcing & procurement strategies), which is necessary to guarantee competitiveness across a product’s life cycle. We also define a product cost target for engineering design that enables a supply chain to deliver a competitive cost and consequently allow an acceptable level of profitability”.

In Company D, the role of both LCC and TC in NPD decisions is indicative. Why is LCC used? In contrast with other companies with a long length of PLC, Company D combines TC and LCC as strategic costing techniques for reducing the cost of new products to stay competitive in the global market. Corporate accountants do not consider it un-realistic to assess the entire long life cycle. The culture has important influences on the development of the strategy.

In relation to the use of VE and TD analysis approaches, the interviewee added that:

“Value engineering – We try to develop products that meet customer requirements, as well as improve customer benefits and the business case. We depend on each new product component to understand and validate the potential target costing”. [...] “Tear-down analysis – based on customer public information we evaluate a competitor’s product KPI performance in case competition is better when we try to close the gap”.

Like Companies A, B and C, Company D emphasized the extensive role of financial and non-financial information in decision-making. Furthermore, TC, LCC, VE and TD support strategies to invest in NPD. Company D seems to use more advanced and structured SMA techniques than other companies to align accounting and strategy.

5.1.5 Company E

Company E, a German organization, is a public and non-listed company pursuing a multi-domestic strategy in the cutting tools industry. Different SBUs operate in private-sector markets

that are exposed to a relatively stable competitive environment in growing product technologies with a medium to long length of PLC (6-7 years).

On the questions regarding the use of financial and non-financial information to support corporate strategy to invest in NPD, the General Manager noted that:

“New product development has been key for the success of the company”. [...] “Financial information is playing a major role in normal projects” [...] “In case of high strategic projects (radically new products or new process, etc.) a decision to proceed can be taken in case of negative economic indicators, which are purely based on strategic relevance for the company” [...] “Some financial information flows into the process of NPD, and the decision whether to go or not is (also) based on the payback period and/or net present value”.

In terms of the extent to which strategic activities to invest in NPD are based on TC and LCC the interviewee noted that:

“There is [...] different relevance for different types of projects. For projects based on the existing state of the art technology (range extension/upgrade of existing products) the main instruments are price benchmarking and, if necessary, target costing. An evaluation of life cycle costing only used in the case of bigger projects”.

Our interpretation is that Company E basically relies more on financial considerations. Financial appraisal techniques, based mainly on accounting concepts, prevail over non-financial criteria. However, greater emphasis is placed on project teams created from the company's principal functions to obtain information useful for strategy development of new products. On the other hand, Company E considered TC, but this strategic cost technique to reduce the cost of new products is less important than benchmarking. LCC is slight.

In relation to the use of VE and TD analysis approaches, the interviewee notes that:

“Value engineering (even if not called (in) this way) is performed regularly. Every time the price positioning of a product has to be defined, one of the main keys is the value for customers/user. For example, if we assess that our product has a 20% advantage in longevity versus competitors, we might decide to position it (and market) with a 10% higher price”. [...] “A competitor's products are analysed and measured to understand the impact of a technical solution on performance, a tear-down analysis in order to identify process is not really performed”.

5.1.6 Company F

Company F, an Italian organization, is a family business and a non-listed company pursuing an exporting strategy in the home furnishing industry. It operates in private-sector markets that are exposed to a relatively stable competitive environment in growing product technologies with a long length of PLC (8-9 years).

On the questions regarding the use of financial and non-financial information to support corporate strategy to invest in NPD, the Chief Financial Officer (CFO) noted that:

“The company seeks to promote the best Italian design offering quality products at an affordable price. NPD is a structured process and is at the heart of the company; a product committee (CP), which meets regularly, operates under a set of defined rules”. [...] “Financial

and non-financial information is equally important in NPD. Regarding financial information, we can state the purchase of raw materials and semi-finished goods, as well as labour”.

In terms of the extent to which strategic activities to invest in NPD are based on TC and LCC, the interviewee noted that:

“The NPD process is based on target costing. The target cost is set according to product type and to competitors”.

In Company F, the role of TC in NPD decisions is relevant. Why is LCC absent? While the use of TC is considered an important technique for reducing the cost of new products in the context of rapid product innovation, LCC appears unpractical for a long length of PLC. The growing product technology forced company F to develop new products with an original furnishing design for niches in the exporting markets and at the lowest possible cost.

In relation to the use of VE and TD analysis approaches, the interviewee noted that:

“Target costing is applied to determine the standard cost of new products before passing to the production stage. Should output not be satisfactory (in term of theoretical marginality for the company) the estimates are adjusted through the application of the value engineering process, searching for alternative supply chains or less costly technical solution”.

5.1.7 Company G

Company G, a US organization, is a public and listed company pursuing a global strategy in the capital goods sector with established industrial experience. Different SBUs operate mainly in private-sector markets that are exposed to an increasingly competitive environment in growing product technologies and a very long length of PLC (≥ 10 years) in its major industrial sectors.

On the questions regarding the use of financial and non-financial information to support corporate strategy to invest in NPD, the Head of Product Development Finance & Engineering Control commented that:

“The business case for any type of large or small investment in the product start from the analysis of the customer needs and related past and prospective trends, competition analysis (product features, price, market share, distribution and services), how we want to position and differentiate our products in the marketplace even across our own brands” [...] “All these inputs support the preparation of the financials that always accompany a business case” [...] We have adopted a financial model based on the discount cash flow comparing different alternatives from the most simple (do programme, do nothing) to the most articulated (make/buy, organic/inorganic growth)...Financial merit is not the only driver in the decision-making process, but represents a compulsory step in the presentation of the business case at all levels in the organization in order to seek approval for any type of product, and non-product, initiative”.

In terms of the extent to which strategic activities to invest in NPD are based on TC and LCC, the interviewee remarked that:

“Cost targets are used, in particular, when developing a new product, or a new component for a product (e.g., a transmission, cab or engine). Product initiatives consider the initial

investments to design, manufacture and launch a new product, but not the maintenance of the product in its life cycle". [...] In consideration of the long life cycle of the products in our industry, it is not only unpractical, but impossible and unrealistic to assess and plan for the whole life cycle when initiating the renewal of a range or a product. Obviously, extreme attention is provided to the mega-trends and the long-term impacts of certain technologies that are deemed to shift the demand in certain directions to avoid a decision based on a shorter timeframe (typically 5/8 years in most of our cases) might result sub-optimally in the long run".

While the role of TC in NPD decisions is indicative, less important is the use of LCC because the management considers it impossible and unrealistic to assess and plan the whole life cycle. In this case study, considering the long length of the PLC, the usage of TC it is important primarily during the planning phase as a method for reducing costs through product design. Then, Company G, like Company A, operates in a growing competitive environment where product (and process) technologies change rapidly and develops the use of kaizen costing during the manufacturing phase as method for reducing product cost during the manufacturing cycle to increase efficiency, as well as remain competitive and profitable.

In relation to the use of VE and TD analysis approaches, the interviewee notes that:

"Benchmarking and tear-down techniques are used particularly for those products where we experience lower than average profitability. In particular, in the areas dedicated to tear-down, some standard tools are used with the aim of creating and managing a special catalogue with material, weight, dimensions, shapes, and diving photos"

5.1.8 Summary of the interview results of the first stage

In summary, the interviews suggest that cost management through TC and LCC was used by the companies to measure and manage the cost of new products and services. In particular, the study indicated that TC, as a specific method to reduce cost in the RD&E cycle, was more important than LCC to support corporate strategy to invest in NPD. While the study provides evidence that all seven companies involved in the interviews use VE, very few international companies tend to use TD analysis in new product design.

While the study indicates differences regarding strategic consideration and financial and non-financial information, the interviews note some contextual insights concerning the manner in which notions and applications of TC and LCC and are expressed. These are considered below.

Company B, which pursues a multi-domestic strategy based on technological and service innovation in fixed and mobile ultra-broadband, is interesting because the management emphasizes a more strategic consideration, such as competitive advantage, than financial analysis in evaluating NPD. Furthermore, while the RD&E cycle is made internally using both TC and VE, the manufacturing cycle is made externally. The related costs are predetermined by TC, and the company monitors the quality standard. Company E, which pursues a multi-domestic strategy focusing on product performance and specific material, places greater emphasis on financial consideration. In contrast with the majority of companies involved in the interviews, the use of TC takes place only in the case of bigger projects. Company F, which pursues an exporting strategy based on the best Italian design combining quality products and an affordable price, indicates that the information provided by TC was minimal and influenced by the requirement of strategic

management. TC is similar to a standard costing⁸. The emphasis is more on financial considerations.

Companies A, C, D and G, as global organizations, use TC and VE extensively in the RD&E cycle, and kaizen costing in the manufacturing cycle in order to reduce cost of product design and improve efficiency, respectively. However, LCC is used only in Companies C and D. Here, in our interpretation, it appears that TC and LCC usage, to support strategy to invest in NPD, reflects the organizational culture. Furthermore, Companies A, C, D and G opt for a combination of strategic consideration and financial consideration, using sophisticated financial and non-financial information, rather than only financial information, in product development strategy.

A strategic approach to invest in product development in the seven companies involved in the interviews is summarized in Table 2.

INSERT TABLE 2 ABOUT HERE

5.2 Interview results of the second stage and interpretation

In the second stage, which integrates the first analysis, interviews were undertaken with the same senior corporate accountants and include two critical questions for a qualitative study. In this second stage, the interviewees were asked to answer the following questions: (a) How do companies use TC to align strategy and new product development? (b) Why do companies adopt TC, in their specific practices, to support new product development strategy?

(a) The most widely cited use of TC was both performance measurement and strategic management. This is indicative that large international companies are transforming TC from performance measurement to a strategic management in order to align cost and strategy. In our interpretation, the interviews express the view that international competition is increasing at high rates, customers are demanding new technological products and services, and companies must rapidly introduce products innovation in the market at the lowest cost. To remain competitive, companies are forced (tend) to adopt TC as a method to reduce the costs of new products and services in the RD&E stage. Furthermore, in this study, 5 of 7 senior corporate accountants involved in the interviews indicate that TC emphasizes the linkage of cost measurement to strategy.

For example, interviewee D – from a company in the home appliances and appliance for professional industry - commented as follows:

“Target costing is a crucial step in the product development process. It is a key for different aspects: to take decisions if a project is launched; it requires alignment between marketing (the function that requires the product) and R&D. The target cost is the synthesis of new product features/requirements and technical solution. As a target, it is the reference for execution of the project. In this perspective, target costing is both a measurement system and a mean for strategy execution”.

(b) Interviewees were asked to comment why companies adopt TC, in their specific practices, to support NPD strategy. Companies A, C, D, E and G provided a response to these questions. In general, these companies explained that they adopt TC to support NPD strategies mainly because in their practices these strategic costing techniques are appropriate to reduce new product and

⁸ Under traditional standard costing system, the variance analysis compare actual and standard costs. With target costing the goal is to achieve cost reduction targets.

service costs. The opinions of the interviewees can be interpreted, in a context of growing international competition, as highly rational because the firms need information for decision-making and strategy execution.

For example, interviewee A, from a global company in the automotive industry, commented as follows:

“We adopt TC [...] to reduce new product costs in order to be more competitive”

The comments provided by interviewee G, from a global company in the capital goods sector, were insightful:

“The Company uses target costing techniques to add products that are accretive to the existing level of profitability as a way to increase shareholder value in line with the strategic targets as defined, and periodically updated, in our so-called Strategic Business Plan”, typically a 5 year exercise). Part of the management variable compensation is linked with the achievement of these targets. All the three aspects mentioned in the question are, therefore, valid for (the Company)”.

In conclusion, the interviews developed in the second stage, for integrate this qualitative study; indicate that most international companies use TC both as a performance measurement and strategic management.

Furthermore, the respondents explain that their large international companies use TC to support the strategy to invest in NPD because this strategic costing technique is more appropriate to reduce costs of new products and services in the RD&E stage. In other words, TC provides information for decision-making and strategy execution.

6. Discussion and conclusion

The aim of this study, using a qualitative method, is to examine and interpret the relationship between strategy to invest in NPD and TC and LCC usage, to assess whether TC develops value engineering (VE) and tear-down (TD) approaches in new product design. Furthermore, the purpose of the interviews was to determine how the companies adopt TC to align strategy and NPD and why companies adopt TC in their specific practices. The data collected in seven large international companies from four countries – Italy, Sweden, Germany and the United States – were interpreted using the cost and management accounting literature.

In the discussion, the papers reflect the results of the seven companies operating in Italy in different industries and compare the empirical evidence provided by some field-based research on SMA developed in the last two decades⁹.

6.1 Summary of the results and international comparisons

It is interesting to note that the strategic literature focusing on new product development suggests that this corporate strategy orientation is expensive and risky, especially in the form of product innovations.

⁹ See the special issue in Moll (2015) for a collection of papers seeking insight into accounting and control and NPD processes.

However, corporate strategy for product development plays a critical role for the long-term competitiveness and profitability and is a prerequisite to remaining competitive and therefore participating in a dynamic and technological international business environment.¹⁰

In this context, the strategic accounting literature indicates that with these objectives the strategy to invest in NPD requires alignment between strategy and accounting. This issue is relevant, but how is it done in practice? To empirically assess the conceptual basis to support the strategic process to invest in NPD, we summarize how is it done in the practice of international companies. Let us look at the summary of results following the research propositions (P).

Proposition P1 – where new product development tends to use financial and non-financial information rather than only financial information - is “partially” supported. This result is partially consistent with the UK study of Bhimani and Langfield-Smith (2007). However, especially in Companies A, C, D and G (the largest international companies with a global strategy), the deployment of strategic consideration and a combination of financial information are pervasive, as are non-financial criteria and approaches to assessing risk.

Proposition P2 – where target costing is more important than life cycle costing for product development processes - is supported. This result can be considered consistent with the evidence from Japan, highlighted by Cooper (1996), which observes the heavy orientation toward the design of target costing for managing the costs of future products. The empirical evidence provides that target costing is used across the all seven large international companies, whereas very few companies tend to use the life cycle costing systematically.¹¹

Considering a plausible assumption, we can adopt our interview results as a proxy of the survey results, on the usage of target costing and life cycle costing, by several previous international studies. Using descriptive statistics, with a scale 1-7, the survey results of previous studies, Guilding et al. (2000) in the UK, the USA, and New Zealand; Cadez and Guilding (2007) in Slovenia and Australia; and Cinquini and Tenucci (2010) in Italy tend to confirm the higher orientation towards the usage of target costing and the lower usage of life cycle costing. International comparison shows that target costing registers higher usage scores, especially in Slovenia (3.64), Italy (3.62) and the US (3.19). In contrast, life cycle costing appears to be less used in Australia (2.21), New Zealand (2.43), and the UK (2.60). The significant use of target costing and the limited use of life cycle costing, indicated in the survey by Cinquini e Tenucci (2010) in Italy, can be considered in line with the interview results of this qualitative study.

Proposition P3 – where target costing tends to develop value engineering and tear-down analysis approaches in the new product design – is “partially” supported. This study provides evidence that the value engineering (VE) process is used across the seven large international companies, whereas only two companies (C and D) use tear-down (TD) analysis in the new product design.

In conclusion, the above empirical evidence suggests some different practices to align strategy and accounting, under corporate strategy direction to invest in NPD, and in large international companies. The differences are associated with many variables, but in particular reflect the different types of strategic choices, competitive environment, product technologies, product life cycle and the “culture” of management.

Common results indicate that all large international companies involved in the interviews use TC to align cost and strategy to invest in NPD. In addition, common results indicate that TC is used

¹⁰ For the threefold classification of international firms (global, multi domestic, exporting firms) see Mouritsen (1995). It is important to remember that companies competing internationally can use a combination of strategy type and corporate strategy orientation.

¹¹ See Dunk (2004) for a discussion of the (three) factors that potentially impact the extent to which product life cycle analysis is used in firms.

both as a performance measurement and strategic management. Furthermore, large international companies use TC to support the strategy to invest in NPD, because this strategic costing technique is more appropriate for reducing the costs of new products “in order to be more competitive”.

6.2 Limitations and future research

In interpreting the findings of this study, certain limitations must be considered. In particular, to corroborate the qualitative results can be useful for adopting a combination of qualitative and quantitative methods. Furthermore, a limitation is the number of companies involved in the interviews.

This study notes some areas for future research. One area is a cross-country investigation of the deployment of strategic costing and financial analysis to invest in product development. Such research would be useful in drawing out the existence of specific national practices. Of equal interest would be describing strategic considerations of costing attributes in managing and measuring the costs of new products. In this regard, Lancaster (1979) argues that products comprise a package of attributes or characteristics that constitute commodities that the firm offers to attract customers. Similarly, Bromwich (1990) suggests that strategic cost management that goes beyond competitor information must consider the number of attributes (benefits) that each product offers to the consumer so that they buy the product. Demand for goods is derived from their underlying characteristics, and the firm should therefore identify a set of benefits to consumers in order to create greater customer value than rival products and provide a firm’s competitive advantage.

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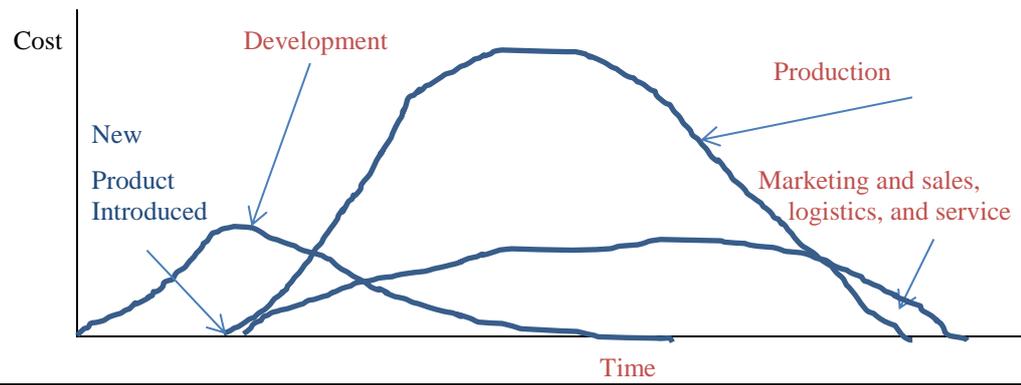
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Figure 1: Corporate strategy directions

		PRODUCTS/SERVICES	
		Existing	New
MARKETS	Existing	Market penetration	New products and services (Product development)
	New	Market development	Conglomerate Diversification

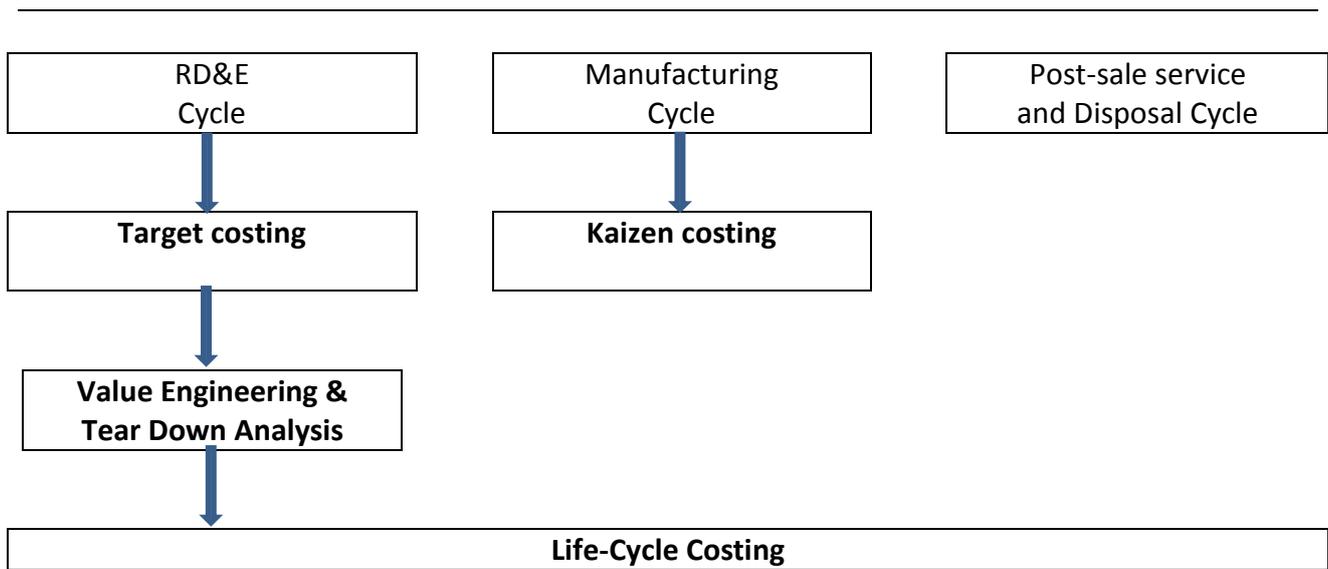
Source: Adapted from Ansoff, *Corporate Strategy*, 1988, Chapter 6.

Figure 2 - Cost curves of the entire life cycle of a product and service



Source: Adapted from Burch (1994)

Figure 3 - Functional life-cycle concepts and typical strategic costing techniques



Source: Adapted from Atkinson et al. (2012)

Table 1 - Information of companies involves in the interviews

Companies	Organization's country of origin	Industry	Company Size (sales million)	Interviewee
A	Italy	Automotive	€110.000	Head of investments and platform controller
B	Italy	Telecommunications	€19.000	Head of strategy Planning
C	Sweden	Home and professional appliances	€12.100	Global Industrial Operation Controller
D	USA	Equipment for oil & gas industry	€3.500	Finance Manager
E	Germany	Cutting tools for wood	€104	General Manager
F	Italy	Home furnishing	€107	Chief Financial Officer
G	USA	Capital goods with industrial experience	\$24.872	Product Development Finance and Investment Control

Table 2 – Strategic approach on new product development of the six companies involved in the interviews

COMPANY	Strategies to invest in new product development	Financial and non-financial information to support new products development	Target costing and life-cycle costing techniques to support new products	Value engineering and tear-down analysis approaches
Company A Design, engineers, production, and sells of vehicles.	To capture new customers and the fidelity of existing one. To ensure survival in a context of harsh competition.	Great emphasis on a combination of strategic and financial consideration. Financial analysis techniques focusing on economic-based techniques (DCF). Non-financial investment criteria mainly use “requirement of customers”. Risk analysis uses more sensitivity techniques.	Target costing usage. Kaizen costing usage during the manufacturing cycle.	Value engineering usage during the product design. Non systematic tear-down analysis usage.
Company B Fixed and mobile telecommunications sector.	Technological and service innovation in fixed and mobile ultra-broadband.	More emphasis on strategic consideration, such benefits from the technology position. Use of financial appraisal techniques and non-financial information to create the business plan.	Use of target costing.	Value engineering is systematically provided. Tear-down analysis is not crucial.
Company C Home appliances and appliance for professional	Act sustainably, create better experiences and improve product and process innovation	Great emphasis on a combination of strategic and financial consideration. Financial analysis techniques focusing on economic-based techniques (NPV and IRR). Non-financial investment criteria mainly use brand image (for to improve market share). Risk analysis uses more sensitivity techniques.	Use of different techniques for measuring costs of existing products and new products. Use target costing for new products in order to ensure that they are profitable before they are launched.	Use of value engineering and tear-down analysis in the product design.
Company D Equipment and services for every segment of the Oil & Gas industry.	Different decisions that generate many new products mainly focused on product innovation and product differentiation.	Emphasis on a combination of strategic and financial consideration. Financial appraisal techniques focusing on economic-based techniques (NPV, IRR). Non-financial investment criteria mainly use keeping up with competition. Risk analysis uses more sensitivity techniques.	Adoption of different costing techniques for existing and future products. New products use target costing and life-cycle costing, with the aim to guaranty competitiveness across product’s life-cycle.	Use of value engineering and tear-down analysis in the product design.

<p>Company E manufactures and distributes cutting tools (circular saw blades and router bits).</p>	<p>Proposal move externally from the market. Strategic decisions mainly tend to improve focusing on product's performance and specific material.</p>	<p>Emphasis more financial consideration. Financial appraisal techniques, mainly based on accounting techniques. Non-financial investment criteria mainly use requirement of customers. Risk analysis, only, for bigger projects.</p>	<p>System designed to reduce cost of existing products use price benchmarking. System focused on managing the cost of future (new) products use life-cycle costing, but only for bigger projects, and target costing in little case.</p>	<p>While value engineering is performed regularly, tear-down analysis is not systematically performed.</p>
<p>Company F manufactures and distributes chairs, table, beds, sofas and accessories.</p>	<p>Promote the best Italian design on home furnishing combining quality products and affordable price.</p>	<p>A product committee emphasizes more financial consideration. Financial appraisal techniques mainly use accounting-based techniques. Non- financial criteria evaluate quality and reliability of output.</p>	<p>Target costing is applied (but as standard cost). Life-cycle costing is absent.</p>	<p>Use of value engineering approach in the product design. The use of tear-down analysis is very limited, not structured and formal.</p>
<p>Company G Capital goods with a wide range of products and a worldwide presence. Its principal industrial sector are: tractors and agriculture machinery; commercial vehicles.</p>	<p>Believes innovation is essential to offering customers highly technological, eco-friendly safe and ergonomic product with a low total cost of ownership. The development of autonomous commercial vehicles is particular relevant.</p>	<p>Great emphasis on a combination of strategic and financial consideration. Financial analysis techniques focusing on economic-based techniques, such as NPV, IRR. Non-financial investment criteria mainly use "requirement of customers based on a customer's segmentation. "The WACC is defined as a hurdle rate and is differentiated by geography"</p>	<p>Target costing usage. The use of Kaizen costing usage during the manufacturing cycle. The company consider the long life costing impossible and unrealistic to assess because the length of PLC is very long.</p>	<p>The use of Value engineering during product design.</p>
