CHALMERS

Integrating Environmental Aspects into Management Accounting Practices

- Identifying Problems and Outlining Solutions

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Abstract

This paper identifies the challenges of integrating environmental aspects into Management Accounting Practices by conducting a qualitative case study at SKF. Taking a process-oriented approach, the paper identifies the complexities and gives a realistic view of the solutions currently pursued at large public firms. Financial controllers with business school backgrounds were at the moment mainly using traditional management accounting systems based on financial data, although recognizing the importance of environmental aspects for financial performance. Lack of knowledge in environmental aspects prevented controllers from using existing environmental methods in evaluation of investment proposals. This paper supports a wider spread of knowledge on environmental aspects in society so key organizational actors such as financial controllers accept the environmental dimension of investment decisions in addition to finance, quality or operational aspects.

Keywords: Management Accounting Systems, Management Accounting Innovation, Management Accounting Change, Environmental Management Accounting

Introduction

Management control includes all the systems used to ensure that the behaviors and decisions of the organizational members (managers and employees) are consistent with the organization's objectives and strategies (Merchant & Van der Stede, 2007). Management controls influence managers' and employees' behaviors and actions in desirable ways to increase the probability that the organization will achieve its goals, which is necessary to implement any strategies, even sustainability strategies. It can be conceptualized as located on the far end of a *processes* continuum involving *objective/mission/vision setting*, *strategy formulation*, and *management controls* (Merchant & Van der Steede, 2007; Simons, 2000).

First, objectives of the organization must be known before any management control system can be effective. Objectives can be of a financial character (such as profit-maximization), but not necessarily. The case firm chosen for this study, SKF, communicates ambitious sustainability objectives and performance. Thus there seems to be an equal status among the objectives. Mission and vision statements may supplement objectives. A mission expresses the reason why the firm exists. It is normally found on the firm's website, but could be in the legal charter or articles of incorporation as well. It gives a macro perspective to all of the firm's activities (Mintzberg, 1987). The mission can be rooted in history, culture and values to guide managers and employees how to respond to the many opportunities presented to them. The vision is similar to objectives in the sense that it is describing a desirable future state that the organization aims for, but on an even higher aggregated level (Normann, 2001).

Second, strategy defines how organizations should use their resources and capabilities to move from a current state to a future state (to achieve objectives/mission/vision of the firm). Business strategy deals with how the firm competes in product or service markets, in particular, how to attract customers and build market share. Generally, an understanding of external competitive market dynamics and/or internal firm-specific resources/capabilities is common input to this process (Simons, 2000; Porter, 1988). However, local experimentation and replication can suggest how to adjust the strategy. Bottom-up or emergent strategies are often the product of serendipity and a willingness to embrace new

circumstances (Mintzberg, 1987). Organizational learning will take place if changes are monitored and processes; products or services are adjusted accordingly. Thus management controls should encourage innovation and experimentation. Another approach to top-down strategy formulation was introduced by Normann (2001). Normann suggested that methods such as scenario planning should be the major input in the strategy formulation process, as opposed to historical information (he argues that e.g. forecasts based on historical data have failed to predict the future too many times). Thus the firm that envisions the future and build resources/capabilities accordingly will be better prepared to cope with e.g. disruptive technologies (cf. Christensen, 1997). As it turns out, SKF have formulated a sustainability strategy and has a track record of good performance on e.g. CO2 reduction.

Finally, management controls are the processes or systems that enable managers and employees to understand what is expected from them and making sure they work consistently and hard to do what is expected from them (implementing the strategy), and finally making sure they are capable of doing a good job. In other words, these processes communicate the firm's strategy to the managers and employees and coordinate the allocation of internal resources/capabilities to ensure that the strategy is effectively implemented. Three categories are used to disaggregate the management control package: Design of organizational structures; formal controls; and less formal (personnel/cultural/value) controls (e.g. Merchant & Van der Stede, 2007). It is the one in the middle that this study focuses on: the formal controls. Formal controls refer to management accounting systems (MAS) such as profit planning, activity-based costing (ABC) and other performance-management methods such as balanced-scorecard (BSC), or economic value added (EVA). This paper will use the term *management accounting systems* from here on when these administrative technologies and methods are discussed.

The introduction of sustainability aspects into the overall objectives or strategies of the firm sparks some controversies. Economic theory and the so-called shareholder model make the argument that long-term profit maximization leads to maximization of social welfare as well (given that monopolies or externalities are not present). As value is created through the firm's processes where inputs are transformed into outputs, the profits are, allegedly, the best indicator of value that managers should pay attention to. Put simply all constituents in this process (e.g. employees, suppliers, financial institutions and so on) benefit their fair share as they offer and *sell* inputs at price-levels above (or leveled with) their firms' cost structure (otherwise they would not have sold their products or services since that would have made them worse off). Combined with basic human preferences for expensive consumption (providing happiness) and economic growth making society and individuals richer, the line of argument above stresses that firms should be managed from the point-of-view of the shareholder model to optimize benefits to society (Jensen, 2001)).

Research on the environment and about social welfare indicates that the aggregated activities of firms actually are destroying environmental and social value. Researchers and practitioners (e.g. Gray, 2006; WBCSD, 2009) argue that the notion of value creation has to be reassessed so that the activities of firms fundamentally change to save the planet from tragedy (economical, ecological and social). In addition, the presence of externalities is clear. Every product development decision has its price for society in terms of impact and damage costs, and regulators are already introducing legislation and taxes that forces firms to internalize the externalities (Petulla, 1980; Chouinard et al, 2011). Such macro level developments will ultimately affect micro level firm processes.

The so-called stakeholder model questions the assumption that simply maximizing the return to shareholders creates value. The model stress that firms should foremost make sure to treat people, society, environment and other stakeholders fairly before profits are made. These stakeholders provide more crucial resources and capabilities to the firms than financial capital does. In most cases, these

resources and capabilities are what create more or less sustainable competitive advantage while capital is readily available (Gray, 2006). Both the stakeholder model and the shareholder model have an interest in firms' operating sustainably, as defined by operating today so that future generations can enjoy similar possibilities as ours (Report of the Brundtland Commission, 1987). Thus the two models should not be so incompatible after all (Chouinard et al, 2011).

World Business Council for Sustainable Development (WBCSD, 2009) summarizes the challenges we face as the developed societies of the world are exceeding the planet's capacity and the business-as-usual scenario will take us to a far worse social, environmental and financial place in just 40 years time (2050). A vast majority of the world's population will live in urban areas, extreme water stress and a trend of increasing human development has a detrimental effect on human activities' environmental footprint (beyond the planet's capacity). In addition, as opposed to common belief, new research indicates that economic growth makes individuals in a society increasingly unhappy on many levels (Gray, 2006). To conclude, value creation activities of firms must be reassessed in time for the sake of the planet and its inhabitants.

Efforts to incorporate sustainability aspects into activities of firms have been ongoing recently. Most noticeable are the various forms of external reporting on environmental and social aspects, based on either legislative or voluntary basis, that firms frequently provide through their assigned sustainability function (or CSR function). Research indicates that this is not enough to drive satisfactory outcomes, and firms should instead integrate such aspects into their internal activities and structures, such as their management accounting systems (Schaltegger & Burritt, 2000). Survey-based research and consultancy reports have tried to determine attitudes towards integrating sustainability practices into these systems. Most common are the surveys of Chief Financial Officers (CFO) in the UK, the US and Australia (e.g. Wilmshurst & Frost, 2001; CFO research services, 2008). This study aims to show the complexity of this type of integration at SKF to give a more realistic picture. As opposed to the survey-based research, this paper instead gives an account of what is actually happening in the organization, what the actors (managers and employees) say is happening, and how they make sense of their situation with regards to the integration of environmental methods. Moreover, actors' perceptions of challenges will be accounted for in their own words instead of the researcher's predetermined concepts (as survey-based research normally does). Thus the research problems that will be addressed are:

1. What solutions to the integration of environmental aspects into management accounting systems have been pursued?
2. What challenges have been encountered?

The purpose of the paper is twofold. First, the purpose is to contribute to research on management accounting change, management accounting innovations (MAIs) and environmental management accounting (EMA) by showing the complex processes that characterizes the integration of environmental aspects into management accounting systems. Second, the purpose is to contribute to practice by identifying the challenges of such integration processes and highlight the important aspects needed attention for it to materialize any time soon. The world is unarguably in need of sustainable value-creating firms and this study contributes to the work of practitioners trying to make that shift happen.

The paper is structured as follows. First, the theoretical framework discusses relevant analytical tools to assess the empirical material. Second, the methodology of the study describes the research perspective this paper is based on. Third, the empirical section presents SKF's

objectives/mission/vision, environmental strategy and key findings from interviews. Additionally, interviews at ABB and Volvo Buses are included to give the subsequent analysis additional perspectives. Fourth, the discussion connects the empirical section with the theoretical framework to discuss applicable theory and suggest expansion of frameworks to account for the empirics. Finally, the conclusion is summarized and the implications of the study for the wider society are addressed to fulfill the purpose of the study.

Theoretical framework

Studies of environmental management accounting have focused on the concept's definition and some case studies have been conducted on the subject (Bartolomeo et al., 2000; Burritt, 2004). Accountants or controllers role in using environmental methods have also been investigated (Bebbington et al, 1994; Gray, 1992; Wilmshurst & Frost, 2001). Another stream of research studied environmental cost accounting (e.g. Antheaume, 2004; Herbohn, 2005). Environmental management accounting (EMA) are the processes firms use to implement an environmental strategy. Such strategy has a number of positive financial effects (see table 1 below), e.g. cost reductions through eco-efficiency, increased revenues through the development of new green markets and first mover advantages, or building intangible assets or managing risks through e.g. better community relations and improved image (Hart, 1995, Porter & Van der Linde, 1995; Schaltegger & Burritt, 2000; Shrivasta, 1995). Henri & Journault (2010) stressed that eco-control – a method that applies traditional management accounting methods to environmental methods – indirectly influenced economic performance for certain contexts (higher environmental exposure, higher public visibility, higher environmental concern, and larger size) for Canadian manufacturing firms.

Banerjee (2002: 177) defined corporate environmentalism as 'the recognition and integration of environmental concerns into a firm's decision-making process', based on a literature review. Orientation is the centrally practiced communication of adaptability to environmental issues. For example, internal orientation could be the mission statements of environmental concern that has the aim to influence internal actors (employees or managers) to act in a certain way if environmental challenges should arise. External orientation is what many firms' write in their annual reports that aim to assure external actors (investors, regulatory institutions, etcetera) that the firm is handling environmental risks wisely. Corporate environmental strategy could be the environmentally inflicted investment decisions at corporate level that determines which businesses to be in (and not to be in). Business Unit (BU) level environmental strategy is thus how to conduct business in more detail aimed at attracting customer segments that are expecting good environmental performance before purchasing the firms' products or services. Table 1 and 2 below summarizes the effects and exemplifies some of the initiatives of business strategies connected to environmental aspects using the management consulting firm Accenture's frameworks. Studies have focused on the relationship between Banerjee's concepts (trying to define them as variables) by quantifying the level of firms' practice of each activity (e.g. Larsson & Svensson, 2010). However, this study is less interested in whether or not (or to what degree) the variables affect each other, and more interested in the complexity, challenges and solutions of integrating environmental aspects into the management accounting practices. Banerjee's model is good at structuring the complexity of environmental activities of firms' that prioritize environmental aspects at central level. In this case, the focus will be on activities at the business unit in which formal management accounting systems are designed and perhaps used in practice (management accounting practices).

Table 1 **Effects of environmental work on key business aspects**

Income statement focus	Time perspective: Current value	Time perspective: Future value
Revenues	Grow income New products New markets Improved pricing Strengthen position (market share)	Build intangible assets Brand Partnerships HR/talent License to operate
Costs	Reduce costs Eco-efficiency Productivity Circular business	Manage risks Legal compliance Supply chain risk Health and safety Stakeholder expectations

Source: Thomas Haglund Flenström, Sustainable Services Lead, Accenture Sweden.

Table 2 **Initiatives of environmental work**

Circular design, sourcing and materials Use the right materials Source recycled materials Design for recyclability/reusability	Material efficient operations Waste management Integrate waste logistics Cradle-to-grave operating facilities
Circular revenue models/communication From product to service models Capitalize on second life of products Communicate shared values Control/utilize of urban material banks	End-of-life optimization Waste collection/reversed logistics Waste processing (partnerships) Circular integration into reprocessing

Source: Thomas Haglund Flenström, Sustainable Services Lead, Accenture Sweden.

Abrahamson (1991) challenges the common assumption that management accounting innovations are only adopted when they will benefit the adopting organizations due to identified performance gaps. The author claims this assumption only holds when organizations freely and independently can choose management accounting innovation and when they are certain that it will be beneficial. Due to the uncertainty of benefits from these innovations and the many outside organizations that influences the firm, the matter is more complex than what has previously been proposed. Abrahamson provides an overview of four theoretical perspectives explaining the diffusion and rejection of management accounting systems and technologies. The perspectives are distinguished by two dimension, imitation-focus and outside-influence, see table 3 below.

Table 3 **Abrahamson's theoretical perspectives explaining diffusion and rejection of administrative technologies**

Outside-influence dimension		Imitation-focus dimension: Imitation processes do not impel the diffusion or rejection	Imitation-focus dimension: Imitation processes impel the diffusion or rejection
	Organizations within a group determine the diffusion and rejection within this group	Efficient-choice perspective	Fad perspective
	Organizations outside a group determine the diffusion and rejection within this group	Forced-selection perspective	Fashion perspective

Source: Abrahamson E., (1991). Managerial Fads and Fashions: The Diffusion and Rejection of Innovations. *Academy of Management Review*, 16, p. 591.

The former dimension distinguishes between whether or not imitation processes impel the diffusion or rejection of the techniques. The latter dimension whether organizations within or outside the group determine the diffusion and rejection within the group. The first perspective, the traditional efficient-choice perspective (imitation does not impel diffusion/rejection and internal organizations determine diffusion/rejection) occurs when external changes create comparable performance gaps across organizations, which create discrepancies between the firm's objectives and the objectives attainable. Thus similar management accounting innovations are adopted to close these gaps, which is the so-called demand-pull explanation. The other way around is also possible. The supply-push explanations suggest that changes in knowledge about methods due to e.g. research present innovations that reveal new performance gaps or close old gaps. Firms with similar objectives usually adopt similar management accounting innovations to close those gaps. The second perspective, the forced-selection perspective (imitation does not impel diffusion/rejection and external organizations determine diffusion/rejection) occurs when external organizations control sufficient power to force which management accounting innovations will diffuse or be rejected across firms. This can be governmental bodies that have legitimate power to act with force, or the dominant influences that labor unions can exercise when threatening strikes. The third perspective, the fashion perspective (imitation does impel diffusion/rejection and external organizations determine diffusion/rejection) occurs when fashion setters do not have coercive power required to force firms to imitate them. The fashion setters' power to influence fashions instead comes from an ability to inspire firms to trust their choices of management accounting innovations and to copy them. Fashion setters can be business media, consultancy firms, management gurus, or business schools. Their choices may turn out to be efficient or inefficient in the end. In fact, simplification and the interest to sell solutions often leads to inefficient outcomes. The final perspective, the fad perspective (imitation does impel diffusion/rejection and internal organizations determine diffusion/rejection) occurs when institutional norms dictate that the firms conform to certain management accounting innovations to appear legitimate. Bandwagon behavior pressures firms to imitate other firms' adoption decisions. This pressure will increase when more and more adopt the management accounting innovations. Firms have different thresholds (of number of adopters) that determine when they give in to these pressures. Eventually however, the strength of conformity forces firms with higher thresholds to copy as well. To conclude, influence from others is according to Abrahamson (1991) a sign of not freely choosing how to work. Imitation on the other hand is a sign of uncertainty regarding outcome.

Adoption of management accounting systems does not always lead to successful implementation of the new system. Shields (1995) mention seven organizational factors that determine effective implementation of activity-based costing systems: the systems should have support from top-management; they should be linked to competitive strategies (e.g. quality strategies or just-in-time strategies); they should be linked to performance evaluation systems; the implementation process should have enough resources to be completed; the systems should be administered by non-accounting personnel; and the objectives of using the systems in the first place should be clear to everyone involved. Kasurinen (2002) studied the balanced scorecard (BSC) implementation at a Finnish manufacturing company and refined the model developed by Innes and Michell (1990) and Cobb et al. (1995). Kasurinen identified barriers to change in addition to factors that generate change (triggering factors). The triggering factors of importance were distinguished as motivators, catalysts and facilitators. Firstly, motivators were the general changes in the external context of the firm; especially changes impacting competitive market structures, cost structures and technical development in manufacturing. Secondly, catalysts are the direct reasons for triggering change, e.g. bad financial performance, drop in market share, or the actions of competitors. Finally, facilitators are the organizational factors that make change initiatives successful. According to Kasurinen, examples include the accounting functions' level and quality of staff and computing resources; the firm's autonomy from its parent company; and accountants level of authority within the firm. Moreover, Kasurinen's model suggests that so-called change agents are needed to create momentum for change to overcome many of the barriers to change. The barriers to change were defined as confusers, frustrators and delayers. Confusers are aspects at the individual level, e.g. conflicting goals of key managers. Frustrators are aspects on an organizational level, e.g. cultural barriers working against change in general. Delayers are aspects on a technical level, e.g. slow process of data and information that can slow down the whole change process. To conclude, whether change happens and what level of impact on the firm it will have depends on clever management of the issues above, which will vary depending on where in the implementation-process the firm is. Change agents (e.g. senior managers) influence the choice and the implementation of management accounting systems. Involvement of employees and their resistance are seen as barriers to overcome.

These so called factor studies, or survey-based research, represent a functionalist approach where barriers are seen as problems to overcome, not signals of real concern. The managerialist perspective is not questioned and other stakeholders are salient. No interest for processes of power struggles inside the organization, nor fads and fashion. Thus the traditional view of management accounting systems and management accounting change is simplified and tightly connected. Factor studies are based on surveys that point out critical factors to the implementation process and case studies describing the roles of enabling and restricting forces of change. Process-oriented approaches on the other hand recognize other relevant concerns and stakeholders than managers. Change is thus instead viewed as a more complex process with uncertain outcome.

Burns and Scapens (2000) developed a framework for the process of institutionalization in management accounting change. They distinguish between the institutional realm and the realm of action, which is interlinked by the transmission and transformation of rules and routines, see figure 1 below. This also implies the possibility of so-called decoupling of institutional rules from behaviors of the firm's internal actors. The authors look at management accounting change as an ongoing process that sometimes is strengthened or interrupted when e.g. new management accounting systems are introduced or actors resist the change. Institutional rules are embedded in the management accounting systems. Routinisation is needed for such rules to influence the actual management accounting practices of the firm, which means that employees or managers must absorb institutional rules into

their sense-making (how they think) so it shapes their habits and repeated actions. The whole process can be seen in figure 1 below, where rules and routines are encoded within an institutional realm. Organizational actors then enact these rules and routines over and over again (reproduced) through their everyday actions. Finally, the rules and routines are institutionalized (taken for granted by many actors). The process may create considerable changes in the rules and routines as they are interpreted differently throughout the firm. The process can be incomplete as rules and routines are ignored or abandoned with minor influence on managers and employees everyday actions. Burns and Scapens describe this as decoupling, where formally recognized rules have limited influence on actions. Firmly institutionalized action patterns only exist when rules lead to repeated actions and are seen as appropriate/legitimate behaviors. Structures are usually slow to loosen their grip on action patterns, which create strong path dependencies in management accounting change processes.

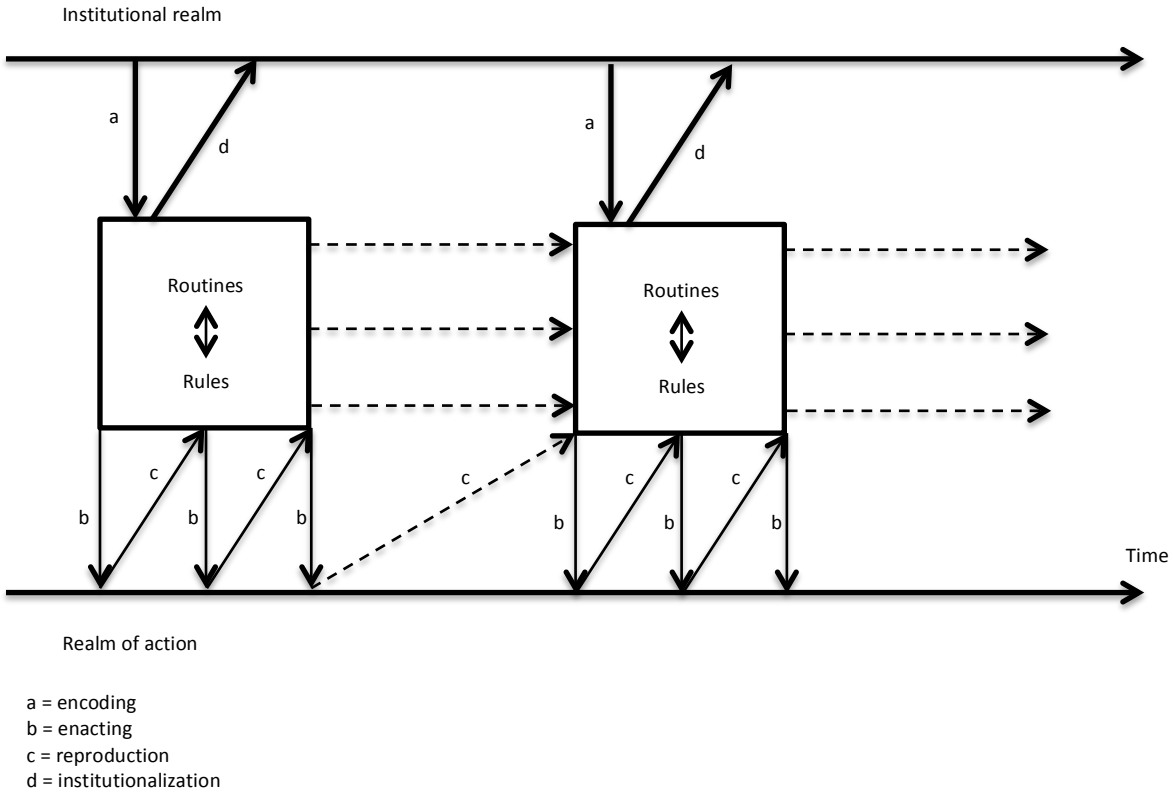

Figure 1 The process of institutionalization

Source: Adapted from Burns and Scapens, 2000, p. 9

The traditional balanced scorecard is a management accounting system that balances financial and operational (non-financial) measures, using both quantitative and qualitative data as inputs (Kaplan & Norton, 1992, 1996, 2000). Soft and intangible assets are measured, in addition to the hard assets (which are found in the accounting databases). In this way, the managers and employees have a dashboard of measures that are thought to be necessary to manage the firm towards future financial results, which should increase their control over the assets that truly drive the firm's market value (Kaplan and Norton stress that there is generally a gap between market and book value of firms). As discussed above, sustainability aspects such as environmental performance are now, more than ever, essential for long-term success of firms. The original balanced scorecard transcends the focus on the financial perspective, and suggests that three additional perspectives are instrumental to achieving good financial performance. These perspectives are: customer; internal processes; and learning &

growth. Aspects such as employee skills are thus recognized more deeply. Hansen (2010) identified four approaches on how to integrate sustainability aspects into balanced scorecards based on a literature review, see table 4 below.

Table 4 **Literature on sustainability extensions of the balanced scorecard**

	Original number of perspectives	Additional perspectives
Same hierarchy	• Traditional balanced scorecard (e.g. Kaplan & Norton, 1996) • Sustainability Balanced Scorecard (e.g. Epstein & Wisner, 2001; Figge, et al., 2001, 2002)	
Modified hierarchy	• SIGMA scorecard (SIGMA, 2003)	• Integrity Scorecard (Bieker & Waxenberger, 2002) • Responsive Business Scorecard (Van der Woerd & Van den Brink, 2004)

Source: Hansen, E. (2010): Responsible Leadership Systems. An Empirical Analysis of Integrating Corporate Responsibility into Leadership Systems. Wiesbaden: Gabler. p. 89

Methodology of the study

The study was conducted in collaboration with a project called *Get the price right* at the competence center CPM in Gothenburg - a competence center where industry (e.g. ABB, Akzo Nobel, SCA, SKF, Volvo Group), academy (e.g. Chalmers University of Technology, Royal Institute of Technology) and government (e.g. Swedish Environmental Protection Agency) meet regularly. The project *Get the price right* was started after the European Union (EU) mentioned an aim in its Integrated Product Policy (IPP) to internalize external environmental costs into firms. CPM's overall objective is to develop credible methods to reduce the environmental impact of current and future production systems in industry (CPM, 2012). CPM was founded in 1996 and was financed by the government until 2006, when it became fully financed by the partner firms instead. CPM perform longer research projects spanning from three to five years, is a referral body to the Swedish Environmental Protection Agency, and advisor to the EU commission. The collaboration between this master's thesis and the project *Get the price right* granted access to meetings and key interviewees, whereas this paper shine light on some of the issues *Get the price right* is interested in from the perspective of business administration (the competence center's research are usually grounded in economics and natural science/engineering perspectives).

A note should be made that the researcher also worked part-time for SKF Marine Strategic Segment in a consulting project parallel with conducting the master's thesis. The empirical data in the master's thesis are not collected from SKF Marine (there are no references to interviews with anyone from SKF Marine) for two reasons. First and foremost, the consulting project's contractual agreement prohibited any disclosure of classified information. Secondly, involving SKF Marine personnel in the master's thesis could have started a conflict of interest affecting the credibility of the master's thesis (e.g. if the interviewees were the ones that determine the researcher's commission). However, some of the researcher's knowledge, impressions and thoughts about SKF were inevitably affected by the part-time consultancy project, which unintentionally might have affected the analysis and conclusions drawn.

The empirical material was collected through semi-structured interviews; participation in workshops and meetings; and observations of both internal and external documents. In short, the study aim to show the complex processes that characterize the integration of environmental aspects into management accounting systems, and identify some of the challenges and opportunities of such integration processes. Initially, the number of case firms was intended to be more than just SKF - to study 3 - 4 large public Swedish firms that perform well on sustainability aspects in addition to the financial objectives. The workload of the master's thesis process forced a limitation upon this ambition, which is the reason why the focus turned to SKF's integration of environmental aspects into management accounting systems and empirics from Volvo Buses and ABB is only partially included and viewed as additional perspectives on the phenomena. 8 semi-structured interviews was held with managers, project leaders, and employees from SKF, ABB, Volvo Buses and CPM; participation in a workshop with 15 SKF controllers from the headquarters and the factory in Gothenburg; participation in a meeting of 4 sustainability managers/scientists from SKF, Volvo Group, ABB, Akzo Nobel at CPM; a presentation by SKF's Chief Financial Officer (CFO) on the subject of integrating sustainability aspects into management accounting systems were attended; and SKF's annual reports, corporate governance reports, sustainability reports, and environmental performance (e.g. CO2 databases) were analyzed. A precautionary note on the limitations of using documents of external reporting is appropriate. According to Hansen (2010), pure documentary research has its limitations; firms may have practices that are beyond what they disclose in documents simply due to defensive reporting or a time lag. The reported systems may also be less sophisticated than real systems, perhaps postponed or even cancelled. To find out what the real practices are (as opposed to the reported practices), Hansen argues that data should preferably be collected from additional data sources (e.g. interviews).

SKF is a leading global manufacturer and supplier of products and services within roller bearings, seals, mechatronics, services and lubrication systems. Its global headquarters is located in Gothenburg, although production and operations are located at 140 sites in 32 countries all over the world (Fast facts, SKF website, 2012). The interviewees from different departments at the Gothenburg office and production site all share some characteristics; they are either working with the management accounting systems as controllers/CFOs or working with sustainability aspects as sustainability managers/scientists. The departments in focus can roughly be characterized as either market-driven strategic segments (such as SKF Railway), or as specialized functions (such as the five business units/technology platforms - Seals, Mechatronics, Services, and Lubrication Systems). Theoretically, there should be some differences in how these two department-types work with management accounting systems (the former market-driven department are likely more focused on customer data, while the latter category of specialized functions/departments are likely more focused on operational data) (Simons, 2000). Therefore, the empirical material involves both department types.

The methodology will follow a qualitative research strategy as it endorses the case study design and semi-structured interviews. Bryman and Bell (2007) describes semi-structured interviews as a common technique to acquire data in qualitative research. As noted in the theoretical overview section above, many studies on the integration of sustainability aspects into management accounting practices have used survey-based methods. These studies aim to contribute with generalizable results to general theories and research. However, by forcing respondents to answer using the researchers' own concepts and words are likely to steer the results in the direction the researcher has set out in advance. The respondents in such studies have mostly been managers at CEO or CFO level, which limits the research to what they say is happening. Thus this study includes data from more actors than just managers and uses open questions (as opposed to closed questions) with the aim of truly

understanding what the interviewees are not just saying when it comes to the prospects of integrating sustainability aspects into MAP, but what they mean/think (their sense-making) and how the management accounting systems are actually used (in practice) and interpreted (thought of) by managers and employees. Additionally, observations of documents and participation in workshops and meetings will also be used in the analysis as empirical input. The conclusions of the study will be based on the unique empirical setting, and not necessarily from a general theoretical framework. Thus the uniqueness of the results connected to the particular setting of the case organization is stressed.

From Burrell and Morgan's perspective (1979), this study has the *subjectivist* assumptions. The firm and the unit is seen as a socially constructed product, thus the directly involved actors' (managers and employees) vocabulary, meaning and practice related to management accounting systems is highly relevant to the understanding of the concept. Moreover, the study's assumptions about the overall purpose of scientific research in a business setting are characterized as *regulatory*. The study will describe what goes on in the particular case and suggest minor changes to improve the situation without making major judgments. Therefore, Burrell and Morgan's framework would place this study in the *interpretative* paradigmatic position, which means that a qualitative research strategy suits perfectly.

Empirical section

Tore Bertilsson, Executive Vice President and Chief Financial Officer (CFO) gave a presentation and answered questions on SKF's current practices of integrating sustainability into management accounting practices. Although SKF is a huge global firm with operations and manufacturing at 140 sites all over the world, Mr. Bertilsson stressed the conformity in their internal management accounting systems.

"SKF is a truly global company – it is run like one company, regardless if we are talking about a factory in Germany or in India. The performance evaluation is the same."

Table 5 **Development of sustainability initiatives at SKF over time**

Year	Initiative
2012	- The BeyondZero Portfolio - WWF Climate Savers
2011	- University Technology Centre Sustainability and Environment
2010	- LEED certifications for new factories
2008	- SKF Code of Conduct for suppliers, subcontractors, authorized distributors
2007	- SKF E2 bearings
2006	- Sustainability Awareness Training
2005	- BeyondZero - OHSAS18001 worldwide certificate
2002	- Code of Conduct
2001	- 1st year member in FTSE4Good
2000	- Zero Accidents; 1st year member in Dow Jones Sustainability Index
1998	- ISO14001 worldwide certificate
1994	- Environmental report
1989	- Environmental policy

Source: Adapted from the presentation by Tore Bertilsson, Executive Vice President and Chief Financial Officer SKF, 2012-05-11

Table 5 above shows the initiatives and accomplishments of SKF in sustainability aspects over time. Employees of SKF in general seem proud to represent a more than 100 year-old firm (SKF was founded in 1907). This is often brought up in conversations and presentations on their sustainability work. They stress that SKF operates with a long-term perspective given their historical background, and plans to stick around for at least another hundred years. SKF defines sustainability in terms of four sub-concepts: Business Care; Environmental Care; Employee Care; and Community Care - forming the head-concept SKF Care, see figure 2 below. In addition, the initiative BeyondZero is SKF's ambition to combine both Environmental Care and Business Care by increasing the positive impact of SKF's operations. By utilizing new technologies to produce more efficient products, the products should then save more energy over their operating lives than the energy consumed in production. (The SKF Commitment, SKF Website, 2012)

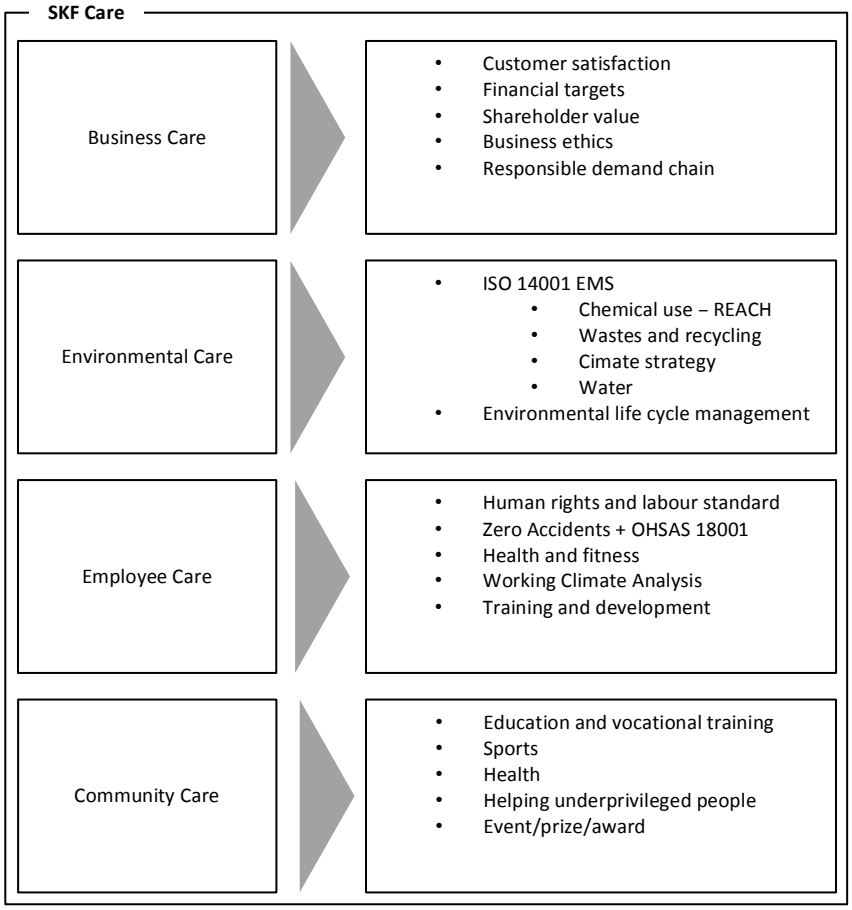

Figure 2 SKF Care

Source: Adapted from the presentation by Tore Bertilsson, Executive Vice President and Chief Financial Officer SKF, 2012-05-11

As the CFO, Mr. Bertilsson is works with Business Care performance in his daily work.

"Business Care is doing the right things for our customers and perform good return to shareholders. That is the way it is. We cannot conduct sustainable activities unless our customer thinks it is good. It has to end up in sufficient results, which depends on the type of industry. (…) It is important to remember the connection (between sustainability and financial results, author's remark). A lot of people get carried away. Unless you produce the results, the sustainability activities just end up as isolated activities."

Table 6 below is SKF's own illustration of its less formal controls in the form of vision, mission, drivers and values. Global leadership and sustained profitable growth is their core mission to accomplish and the concept of sustainable business care does not seem to far away from that mission (*sustained profitable growth*). Moreover, SKF's less formal controls in terms of drivers and values includes sustainability, empowerment, high ethics and openness. These suggest that SKF at least makes an effort to integrate sustainability aspects into its less formal controls.

Table 6 SKF's vision, mission and some of its less formal controls

Vision	To equip the world with SKF knowledge
Mission	To strengthen SKF's global leadership and sustain profitable growth by being the preferred company; • For our customers, distributors and suppliers • For our employees • For our shareholders
Drivers	• Profitability • Quality • Innovation • Speed • Sustainability
Value	• Empowerment • High ethics • Openness • Teamwork

Source: SKF Annual report 2011, p. 0

Within business care, the financial targets and strategy is communicated in the annual report for 2011, see table 7 below. The financial goals explicitly follow the shareholders' perspective, as illustrated by the passage below taken from the annual report.

"SKF's overall financial objective is to create value for its shareholders. Over time, the return on shareholders' investment should exceed the risk-free interest rate by around five percentage points. This is the basis for SKF's financial objectives and SKF's financial performance management model." (SKF Annual report, 2011: 118)

Table 7 SKF's financial targets and strategy

Financial targets	SKF's long-term financial targets (since October 2010). • an operating margin level of 15% • annual sales growth in local currencies of 8% • a return on capital employed of 27%.
Strategy	SKF's business strategy for achieving long-term profitable growth and attaining financial targets includes: • keeping a clear and dedicated customer focus • strengthening the product portfolio through greater investment in R&D

and through acquisitions
- developing new products, solutions and services based on innovative technology, which helps to achieve a better environmental performance
- creating and capturing more value by applying the SKF platform and segment approach
- focusing on rapidly expanding segments and regions
- using Business Excellence to improve efficiency in the business and to reduce capital tied up
- attracting, retaining and developing the right people
- developing and protecting the SKF brand.

Source: SKF Annual report 2011, p. 50

SKF goes to great length to align internal managers interests with the shareholders' financial interests. SKF reports that they have tied extrinsic incentives such as variable salaries to performance indicators that, theoretically, are correlated to long-term share price movements. Residual income models such as economic value-added (or EVA) are designed to help managers see which investment decisions will lead to increased economic value of the firm (which in turn should drive increased market value) by promoting e.g. capital efficiency and wise investments (Merchant & Van der Stede, 2007). Managers are expected to make sure their units create a profit that is better than what the shareholders expect, in this case the expectation were more than 5 % above the risk-free interest rate (and of course a certain level of debt-to-equity ratio as well as borrowing costs).

"(…) SKF's financial performance management model is a simplified, economic value-added model, called Total Value Added (TVA), promoting a greater operating profit, capital efficiency and profitable growth. TVA is the operating profit, less the pre-tax cost of capital in the country where business is conducted. The pre-tax cost of capital is based on a weighted cost of capital with a risk premium of 5% above the risk-free interest rate for the equity part and on actual borrowing cost. The TVA performance for the Group correlates well with the share price trend over a longer period of time. Variable salary schemes are primarily based on this model." (SKF Annual report, 2011: 118)

As mentioned earlier, the BeyondZero initiatives are what combines business care with environmental care. A simplified view of SKF would suggest that a large part of their business is to manufacture a product that is mostly based on steel, whose application in many cases ends up in a polluting machine. Thus from a critical perspective, it seems inevitable that one more unit of output from SKF factories will make the environment slightly worse off. Business care seems incompatible with environmental care. Mr. Bertilsson brought up this problem, and the argument from SKF's point-of-view is that the BeyondZero initiatives are evaluated based on performance in *reduction* of green house gas emissions in terms of *net effect*. For example, raw material extraction, product manufacturing and distribution of the E2 bearing (part of the BeyondZero portfolio) pollutes the air with some level of CO2, but using that bearing in the customer's machine will lead to a *reduction* in CO2 emissions (which otherwise would have been higher). The SKF product's application is thus compared against applying a similar competitor product that would have worse environmental performance (using an industry baseline of a bearing with higher friction (lower energy efficiency)).

"It is about making sure the products and offers has a positive effect on the environment. Our job is to reduce friction – that is the whole business idea. We should do it better than our competitors. (…) However, it is unavoidable that our manufacturing will have negative effects on the environment. We

try not to mess it up, but improve the world instead. The initiative was launched by Tom Johnstone (CEO of SKF, author's remark) who gathered a team of young tigers."

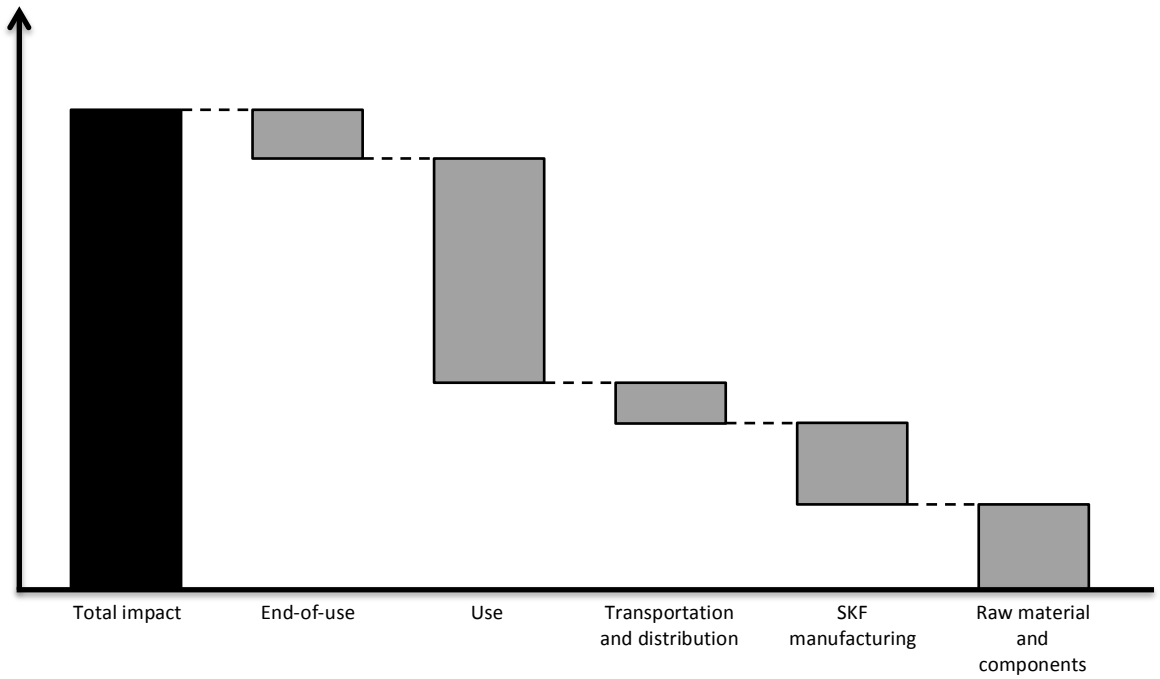

Figure 3 Approximate de-composition of SKF products' total green house gas impact

Source: Adapted from the presentation by Tore Bertilsson, Executive Vice President and Chief Financial Officer SKF, 2012-05-11

According to Mr. Bertilsson, the newly launched Beyond Zero Portfolio of customer solutions with significant environmental benefits (compared to other SKF products and solutions), has two focus areas in order to reduce the largest chunk of SKF's green house gas impact (in the phase of use/application, see figure 3 above): *designed for the environment*; and *applied for the environment*. First, bearings such as the E2 bearing consume 30 % less energy compared to a baseline of industry standards. Second, products and solutions can have a positive impact on the environment through its applications in a more indirect way. For example, the Solar Linear Actuator contributes to increasing the energy production from one solar panel calculated to reduce 4.4 tons of CO2/year (using a baseline of solar panels with no actuator at all that will lead to less time in the sun (more time in the shadows)). The stop-start system and sensor bearings application for cars helps to contribute to up to 15 % better fuel economy, calculated to reach 8-9 gram CO2/km (the baseline in this case is to use no stop-start system at all that will lead to cars' engines still running while waiting for the traffic lights to switch). Key performance indicators for BeyondZero, that Mr. Bertilsson says will be used initially and perhaps be supplemented later on by new ones, are revenues, profitability, CO2 emissions savings, and R&D budget. The revenues generated from the portfolio are currently at a level of 2.5 Billion SEK (approximately 3.5 % of SKF's total sales 2011), and the target for 2016 is 10 Billion SEK. There is however a potential future challenge of using an industry base line the way SKF does at the moment. Just like technology development in general, eventually the competitors' technology will develop and the efficiency frontier will continuously push itself forward. The industry baseline will easily catch up if SKF's products are not improved at a similar pace. Using industry baseline such as *no actuator* or *no stop-start system* is perhaps relevant today (when perhaps the majority of competitor solutions lack these technologies), but in the future it will not be relevant. Mr. Bertilsson recognized the problem:

"(…) Of course, if other competitors would do the same thing (introduce a similar portfolio as the BeyondZero Portfolio, author's remark) then it will be difficult for SKF to become BeyondZero."

SKF has recently been pursuing a 5 % reduction/year target for CO2 in its own operations (manufacturing), see figure 4 below. The recent financial crisis slowed down the activities in SKF's factories, which also reduced their CO2 emissions. It must have been easy for SKF to reach this target then. As production increased in the year 2010 and 2011, SKF had to buy CO2 offsets to be able to claim that they had reached the 5 % targets those years. The following passage is taken from SKF's annual report and gives an explanation to why SKF ultimately chose to skip the 5 % reduction/year target from here on.

"Over the last six years, the 5% absolute reduction target has acted as a strong catalyst for change at SKF. As the results show, having such a tough and uncompromising target has led to a greater focus on energy and carbon, which in turn has driven investments, priorities and the development of relevant skills at the company. However, this target cannot be sustained over the long-term, mainly because the greater production activities in high carbon regions will mean that in future, the major contribution to its achievement can only come from buying offsets. This risks taking the focus away from energy use – which is the most important direct contribution that SKF can make to climate change mitigation at its own manufacturing operations. Therefore the Group has decided to focus directly on energy use within its operations with extremely aggressive targets, which will address both energy use per output and total energy use. With these targets, SKF will assure an even higher pressure and focus on improving energy performance irrespective of the external economic climate. The targets will be announced within the second quarter of 2012." (SKF Annual Report 2011: 58)

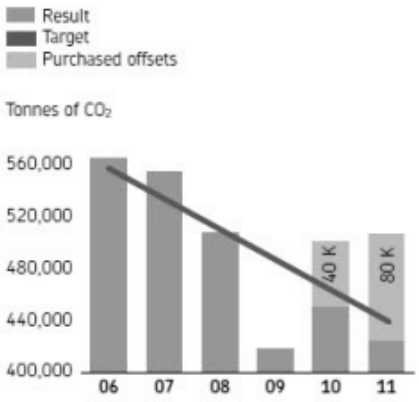

Figure 4 CO2 Results, previous targets and purchased offsets, 2006-2011

Source: SKF Annual Report 2011, p. 58

The new target has two components: reducing the total annual energy use (in GWh) by 5 % below 2006 level by 2016; and reducing the energy use per production output by 5 % year-over-year during the complete period (2012-2016). These two components provide more flexibility regarding the level of production, which fluctuates with the overall economy. Moreover, for the suppliers, SKF requires all major energy-intensive suppliers to achieve the standard ISO 50001 by 2016 and collaborates with some suppliers in R&D activities (such as the so-called *ultra-low CO2 steel initiative*).

Lennart Jehander, Business Controller at SKF Railway, had worked in finance functions most of his professional life – both domestically and abroad – as a business controller at SKF and CFO at a Joint Venture company in the US. His previous position was as Group Controller and January 2011 meant

another challenge as he started in his current position. When asked if he came into contact with environmental aspects in the management accounting systems he worked with, his response was:

"No not really. I only work with accounting and financial systems today. Sure, SKF is very good at tracking e.g. CO2, but it is in separate reporting-databases."

What are the obstacles to overcome before a business controller like you could see yourself working with such numbers?

"The financial systems should include financial parameters. Other system has qualitative data, like CO2. Vi cannot include all of this in the financial database. Our unit works with financial data that is related to sales and production, both accounting information and forecasts - a factory part and a sales part. (…) It does not have anything to do with financial systems. It does not have anything to do with the income statement since it is not costs and revenues. As long as you cannot verify that these qualitative metrics are hard cash, it is out of bounds for my department."

The controllers participating in the workshop supported Mr. Jehander's statement in the interview session that the controllers only worked with accounting and financial systems. The participants acknowledged that SKF had very sophisticated reporting systems for e.g. CO2, but the data generated were not prioritized by the controllers themselves when they were asked to prepare evaluations of investments for decision-makers. The tools that they used were traditional financial ones such as pay back time and net present value (based on a certain level of cost of capital). They thought their role as controllers (with a business school education) were appreciated the most by their fellow engineering coworkers when they left the operational aspects and focused instead on the financial aspects in meetings and discussions regarding investments. One female controller said:

"SKF is a firm dominated by middle-aged male engineers. That is the reality we work in. We depend on the financial models to win arguments. When they talk about technical aspects I often just sit quiet."

The majority of controllers from SKF at the workshop were female. The discussion ended with a general agreement on two challenges; either the environmental aspects should get adjusted to fit the current financial models (translating environmental metrics into money); or the controllers themselves should acquire the knowledge in environmental aspects necessary to argue for such aspects in addition to the financial aspects when preparing evaluation-documents of investments for decision-makers. In the latter option, one controller argued that it would be possible if everyone participating in the investment decision-process were educated in environmental aspects. Then the controller could present financial arguments for each investment option, while simultaneously presenting some form of analysis of environmental impacts of those options. Thus the controllers' previously single focus on finance would be toned down a bit, and the controllers' would also voice arguments of optimizing environmental aspects as well. The controllers saw themselves as highly capable in analytical thinking, which could be an asset for sustainability work if they felt more confident interpreting the environmental data.

Mr. Jehander stressed that he understands the importance of sustainability. The other controllers raised similar views.

"I know that the CEO is personally committed to these objectives. I share the opinion that we have to address these issues. We cannot consume the planet like we have done; it is not sustainable in the long run. (…) My opinion is that the work we do on environmental areas has a positive impact on e.g. our

brand and other parts of SKF. We can combine the environmental work with what we do best. If we lower the friction in a roller bearing for example, that will give us a competitive advantage. It is part of our business model."

According to Mr. Bertilsson, all of the producing units are responsible for measuring environmental aspects, such as CO2 emissions. The whole database of every SKF site around the world is reported externally, see table 8 below for a sample extracted from the report of 2011 data of the Gothenburg plant.

Table 8 Sample from SKF's Energy and CO2 Report: Gothenburg plant, Sweden, in 2011

Country	Plant	Electricity (GigaWattHr)	Heating Energy (GigaWattHr)	Fuel Oil (Metric Tons)	Natural Gas (1000 N Cubic Meters)	LPG (Metric Tons)	CO2 Equivalent of Electricity (Metric Tons)	CO2 Equivalent of Heating Energy (Metric Tons)	CO2 Equivalent of Fuel Oil (Metric Tons)	CO2 Equivalent of Natural Gas (Metric Tons)	CO2 Equivalent of LPG (Metric Tons)	Total CO2 Emissions (Metric Tons)
Sweden	**Gothenburg**	82,53	32,30	28,96	1819,72	16,78	0,00	839,83	92,66	3639,43	50,35	4622,27

Source: Extracted from SKF Energy and CO2 Report - 25th February 2012. Accessed 2012-05-15

"We are going to make money on this (e.g. environmental initiatives, author's remark). If you are determined to perform well in the long-term, then you have to perform well in the short-term. Placing solar energy cells on our roofs could be quite expensive in the short-term. In those cases, we must communicate with investors so they can accept waiting for long-term performance."

Mr. Bertilsson identified two major groups of challenges from a management accounting perspective: how to define and measure significant environmental benefits; and how to integrate environmental issues into business strategy and standard operating procedures. Firstly, a common standard for all firms so they can easily define their products and services with significant environmental benefits. SKF claims that their BeyondZero Portfolio contributes to the development of standards as detailed categories, criteria, and governance processes are developed. In addition, measuring the significant environmental benefits also needs standard methods for all companies, e.g. reductions in CO2 emissions for products and services. SKF's methodology today is benchmarking the impact from their own solution with the impact from the baseline solutions. It is used in sales:

"It gives us good sales arguments. The customers can calculate the payback time of more expensive bearings. However, the customers must accept and trust our calculation methods so that they trust that the savings will come."

Mr. Bertilsson stressed that SKF was currently developing these standards and methods.

"There is a group that is the core in this. They are not only engineers, but also accountants. They try foremost to develop common standards and methods. (…) If you compare it with data on quality aspects, those processes have already been developed. You have to make sure there are common standards in the thinking."

Secondly, the challenge to integrate environmental issues into business strategy and standard operating procedures depends, according to Mr. Bertilsson, on a need to improve *environmental life cycle management* knowledge. In addition, improving methods and processes, updating the IT systems accordingly and *change management* (as most managers and employees will have to change their way of thinking and working).

"We have to develop the concepts, the way we work, and how we report. The data must be a part in the internal reports, so the environmental aspects are talked about up and down in the organization. We are not there yet, just in the beginning of the journey."

Mr. Bertilsson mentioned that environmental data should be in management information such as operational follow-up reports, balanced scorecards, and investment requests. It is learning by doing, an approach where the key challenge is to find a good balance between on the one hand, credibility, seriousness and trustworthiness and on the other hand, usefulness, user friendliness and avoiding "over-engineering".

"We should be humble, no one has the right answers. We have to take one step at the time, learn to crawl before we can walk. Today we have methods that could be applied to a certain degree."

The learning by doing approach was accomplished by running multiple case studies, developing policies and guidelines iteratively, using both top-down and bottom-up processes, and involving 3rd parties for critical review.

Daniel Taube is the one responsible for integrating sustainability aspects into the strategic industries at SKF. Mr. Taube primarily worked with SKF Care directly under the CEO Tom Johnstone. Mr. Taube explained that SKF uses methods such as life-cycle assessment (LCA) to look at the whole life cycle impacts of their products. He stressed the importance of standardized methods to give credible and transparent results. The benefits of SKF's work with sustainability were according to him substantial in the meetings with clients.

"For example, one of our sales arguments is showing the potential clients some pictures of machinery with our products installed. These pictures show a very clean environment with nice floors and walls. There is no oil or grease spills. It can be very convincing for the clients to change (to SKF, author's remark) when they realize that their own factory floor is the complete opposite due to using competitors' products. It is also a question of working environment for clients' employees that have to walk around on such dirty floors – spreading the oil to other rooms. Dust gets stuck in it. In addition, our products reduce noise, which we also inform the clients about. (…) Some client segments have industry and legislative demands to show that their machinery can be scrapped and recycled. These demands are passed down to suppliers, which is us. (…) Our sellers also have a good idea of our products' effects on clients' SOx and NOx pollution. We can proactively push for these things in client discussions even if the demand may not be so high yet."

I understand that a major sales-argument is how your product improves clients' efficiency and reduces their costs. Do you focus on costs in client discussions as well?

"Yes that is correct. Fan-based cooling systems have energy costs that comprise 70 – 80 % of the total life cycle cost. Thus the price of our product matters less if we can show how we reduce the energy loss. If we can impact theses costs by 10 % then that is very good and will impress the client."

We talked about how life cycle aspects are used in the sales parts of the organization. Have you found that product development had to increase their environmental impact due to efforts in decreasing the clients' impacts?

"I see what you mean. This is really interesting and challenging. Some of our products use material of titanium, which is debatable in terms of its environmental damage costs in the extraction of raw material. However, it is so lightweight that some of our clients have big demand for products based on it so they can reduce their costs and environmental impacts. The product might not be environmentally effective, since the net effect is debatable. (…) Having worked with environmental issues for a while now, it has become more clear to me that environmental work is mostly about making trade-offs."

An interview with a strategic development manager, who wished to be anonymous, of one of SKF's five business units/technology platforms (Seals, Mechatronics, Services, or Lubrication Systems), who worked for the unit's management team with business intelligence and developing their strategy.

How do the dimensions of SKF Care influence strategy making at your business unit?

"This is a true challenge. Industrial companies in general are extremely focused on financial controls and targets. However, these results do not just happen by themself. Our activities are what drive the results. In my work, I try to find activities that drive the leading KPIs (key performance indicators, author's remark). I work with hypotheses, which are always more-or-less guesses. Our clients will pay us extra if they have a good gut feeling about what SKF does."

Do you see potential changes in the upcoming years regarding SKF's targets?

"Financial targets do not change much over the years. We have certain revenue and profitability goals. These are more 'results' than strategic leading indicators. We can always balance the financial objectives. For example, revenue and profitability – if we achieve one then we just focus on the other. My opinion is that strategic KPIs should not be changed every year."

Why do you think initiatives like SKF Care or BeyondZero are undertaken?

"SKF cannot only be focused on pushing commoditized bearings to clients. That would lead our customers to focus on price, which would be damaging to our margins. The client relationship is what we must focus on. Having service-level as a strategic KPI in our balanced scorecard means we are implementing such a strategy. Having factories and manufacturing closer to the client might be an appropriate initiative to improve service-level performance. We have a customer satisfaction index that is produced through surveys. It is very important to understand what the market appreciates."

He had an engineering education, and as the strategic development manager, he used more qualitative and operational data as input to the investment proposal he developed, such as market studies from consultancy firms. In this way, the coworkers who stressed financial aspects were coped with to make more sound long-term strategic decisions.

"Internally, it is difficult to get coworkers to invest in the future due the short term quarterly economy. People can have gut feelings of where the business is heading, but it is very difficult to make a solid case based on intuition. Thus the strategic issues I am looking at depend on business intelligence and market studies to give the decision-makers something to base their arguments on so they can invest resources. They can make a case, and say 'my professional judgment says this scenario will happen, and Bain (a strategy management consulting firm, author's remark) also made this prediction'."

Additional perspectives: ABB and Volvo Buses

The author had the opportunity to sit down with managers and specialists at ABB and Volvo Buses during the course of the study thanks to the cooperation with CPM (a competence center in Gothenburg where, academy, industry, and government meet, see the methodology section). The following are selected parts that provide additional perspectives on the challenges of integrating environmental aspects into management accounting systems. ABB and Volvo Buses are two large public firms operating in a similar context as SKF – they are global manufacturing (and service) firms with strong engineering cultures and headquarters in Sweden.

Mats O. Olsson, CFO Strategy and Global Manufacturing at Volvo Buses, recognized the important work of sustainability experts in his organization.

"Our sustainability office is a part of product planning. However, the sustainability manager also had a prominent role in sales when the city of Gothenburg bought environmentally friendly buses from us recently. I guess his knowledge and position helped convince the customer that our product was good."

Mr. Olsson claimed that he had operational metrics and some environmental aspects included in the balanced scorecard he worked with, in addition to financial metrics.

"I will draw how we work (see figure 2 below). The guys in product planning have to listen to the market demand for reduced lifetime costs. Environmental legislation also influences their work at this stage. At the product development stage we have panels of customers, called customer clinics, used to evaluate innovation and connect it to future market demand. Environmental objectives and environmental KPIs (key performance indicators, author´s remark) supplement the financial KPIs in the stages of production. Objectives are set for all KPIs, but it depends on the country and what type of facility. For example, waste and recycling is measured and evaluated against targets."

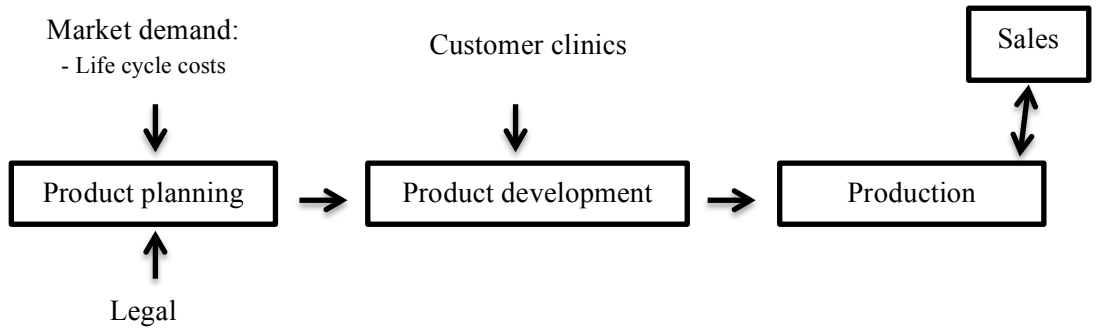

Figure 5 **An overview of Volvo Buses value chain and guiding forces**

What is driving the environmental work at Volvo Buses?

"Indirect external demand from authorities. And we have to keep our costs down due to competition. We have also got EU-subsidies for building factories with, for example, efficient lighting installed, which reduced the costs. The lower costs concern the production, and we make sure to check if we are eligible for external financing (from EU, author's remark). Of course, this will have a positive impact on our costs. Our customers always want to pay less and less. (…) Our factory in Borås was upgraded with EU-subsidies. They made it very energy-efficient. Shortly after, the price on electricity increased substantially in Sweden. Thanks to our new and highly efficient factory we managed to avoid a potentially devastating cost structure. It is very difficult to convince the customer to take on those

increased costs with a higher price. They would never accept such arguments for increased prices. Therefore, it is important from a profitability perspective to keep and improve our margin."

As the case with SKF, Volvo Buses also stress environmental aspects such as energy efficiency in talks with customers. By increasing the energy efficiency in the customer application phase, Volvo Buses are able to sell their products at the premium price-range.

"We use a version of life cycle costs as a model we show customers. The price customers pay are not the only costs that they commit to when buying from us. Our calculation-model shows forecasts of the buses' energy usage, insurance costs and up time (few repairs), which normally shows costs that exceed the initial price and are thus an opportunity for us to charge extra for a superior product that is efficient throughout its life-time. A large part of our business is big contracts for city buses and we sell many hybrid buses. (…) We sell soft products, such as the telematics-system. This system lets the operator of buses get an overview of buses on the road and improve up time by scheduling repairs. Much of this is due to our image. These services have great profitability, better than selling just buses."

Lennart Swanström, Senior Principal Scientist at ABB, is a specialist in sustainability and active on such issues both internally, at ABB, and externally, developing methods in forums such as CPM. He is in the corporate research function for the entire ABB group, and is project leader for developing future strategies that has an outlook period as long as 15 years ahead.

"I work with spreading environmental ways of doing business into the reality. At ABB, this work has three legs: credibility; general acceptance; and relevant to business. Firstly, we are in an industry of credibility – all methods must have a scientific base to be credible. How one should calculate the social costs has been revealed by the academia a long time ago. My role is to check if these methods are still relevant. Secondly, general acceptance means that others in society must acknowledge and work with these methods. Standardization. We are dependent on the outside world. Thirdly, relevant to business means that they cannot be too expensive nor have too high transaction costs, because then it is not a good business case."

"In setting our strategy, we must consider the synchronization of environmental issues and our business strategy – increasing efficiency and lowering environmental impact. The value chain is made out of supply, operation, product, and humans. How do we spread this out into the real world? The dilemma with business today is the mix: one must integrate all systems, both backward looking and future oriented systems. How should core issues of environmental control be integrated into control models for both reporting the past and steering the firm into the future."

Mr. Swanström called for increased understanding of environmental aspects throughout the organization. If the competence level increases on such issues, then decisions in line with good environmental performance are more likely made.

"My role is to build competence so we can organize the work of 140 000 employees. I work with figuring out where the nodes of knowledge should be placed in all this. We (ABB, authors remark) are steering with results control – not action or cultural control. How do we organize the work?"

Yes, and how do you organize the work?

"We have a sustainability network. There are sustainability controllers in all 50 countries. A person at the country-level, and the responsibility setting objectives and following up on results is right there. They work with work conditions, sustainable development, and environment. Not all of them do this

full-time, and all are not environmental specialists. Thus the issue is where competence should be developed."

Mr. Swanström also stressed the context in which ABB operates in to have influence on their sustainability work. He mentions the importance of groups like CPM to develop decision support methods, so 'finance people' accepts arguments based on environmental input.

"Of course the mega trends of climate change and urbanization. There are also increases in risks in the world. Legislation is another. Not to mention our primary stakeholders; employees, customers, investors and legislators. (…) I do not find any collision between environmental performance and financial performance. For me, economics is to divide scarce resources. That is very close to what environmental work is all about. The less material used, the lower costs. The problem starts at models of incentives. The society currently support fossil fuel and extraction of oil. ABB operate within a frame, but the frame changes all of the time. (…) We should act within this frame to the full extent, do everything we can. But the question is; are we doing our best within our frame? I would say yes. We invest in products that costs three times more. We need CPM for this."

What are the biggest challenges?

"To develop decision support methods. From my point-of-view, firms are just following what the society says. We need these new trading systems on CO2. ABB cannot change the society. We are dependent. The frame is changing. We must be realistic, not idealistic. We must understand the mega trends. We have to be able to talk to finance people and argue for our case."

Discussion

The question whether SKF follows the shareholder or stakeholder approach to its overall objectives on an aggregated level is, at a first glance, not so clear. On the one hand, the explicit mission of SKF is to strengthen their global leadership and achieving profitable growth. Financial objectives have a prominent position in SKF's external communication. Perhaps this is due to a majority of readers of the annual reports are financial analysts or shareholders. Perhaps it is instead a sign of were SKF's true priorities are. On the other hand, SKF also stresses in their mission statement that they want to be the preferred partner company to customers, distributors, suppliers, and employees – a classical stakeholder approach. Sustainability is one of SKF's strategic drivers; the annual report is structured around three additional perspectives (not just financial, but also environmental, employee, and community aspects); and BeyondZero unarguably is deeply rooted in its business model. Sure, SKF's overall financial objective is to create value for shareholders, but that seems logical given that top-management of SKF are hired by the board of directors, of which the majority are elected to represent the shareholders. For a listed company like SKF, shareholders are known to be quite impatient with poor performing management. One can frequently read in the business press about CEO's that are let go due to unsatisfactory financial performance. But financial performance is only the results and outcome of the activities and processes of the firm. There seemed to be a broad understanding by the interviewees that operational and environmental aspects drive financial performance. Table 9 below summarizes the controllers' view of how environmental work affected the financial results.

Table 9 **Summary of SKF controllers' expectations of positive financial effects from environmental work**

Income statement focus	Time perspective: Current value	Time perspective: Future value
Revenues	Grow income New products New markets Improved pricing Strengthen position (market share)	Build intangible assets Brand Partnerships ~~HR/talent~~ ~~License to operate~~
Costs	Reduce costs Eco-efficiency Productivity Circular business	Manage risks ~~Legal compliance~~ ~~Supply chain risk~~ Health and safety Stakeholder expectations

Note: The interviewees did not mention the crossed out effects.

Using techniques such as the modified economic value-added (EVA) model called Total Value Added (TVA) enables the rest of the organization to take on some of the CEO's responsibilities for achieving the financial targets through capital efficiency. However, the activities that drive the financial performance are complex and, at least partly, depend on the successful pursuit of environmental strategies. It is no surprise that the market-driven strategic segment focused on the Railway industry, where Mr. Jehander worked as Business Controller, has performance targets related to sales and production based on accounting information and forecasts. The Railway strategic segment is specialized in the needs of customers in the railway industry and Mr. Jehander and his coworkers' job is to adapt SKF's product and service range to meet those specific needs. It is currently plants such as the one in Gothenburg that are the organizational units reporting environmental performance (e.g. CO2) upwards in the organization (the data does not pass through the Railway work unit's management accounting systems).

Customers of SKF have a sometimes a narrow focus on reducing their own negative impact. From the society's point of view, the net effects should of course be strived for. On the topic of lightweight titanium bearings some uncertainty existed whether or not the environmental net effect were positive. Huge demand for lightweight products based on titanium reduces the customers' costs and environmental impacts while the net effect is debatable. This suggests that whole supply chains should share environmental data horizontally on issues regarding impacts of component and material choices. Or else situations like this can occur; where one firm's environmental performance is optimized on the expense of the net environmental effects.

The actual implementation of the environmental strategy at SKF takes the form of balanced scorecard KPIs directed at operational and environmental metrics, e.g. CO2 or energy use. These systems are foremost affecting operational personnel, working in e.g. production or specialized functions, and not affecting the market-driven strategic segments such as SKF Railway. Next, the analysis will go deeper into the theoretical implications of the study, using the frameworks of Abrahamson (1991) as well as Burns & Scapens (2000).

The ongoing integration of environmental aspects into management accounting systems can be analyzed using Abrahamson's (1991) four perspectives on the diffusion and rejection of administrative technologies (see table 3, theoretical framework section). Firstly, the efficient-choice perspective stress that major changes in the external competitive landscape have created performance gaps in the

industry. One example is how SKF are able to charge their customers a premium price for environmentally effective solutions. Increasingly, firms that position themselves beyond just selling commoditized products - but provide additional value to the customers through e.g. high quality, innovative, environmental, and energy-efficient products and/or services – take the lead and expand the performance gaps. SKF aims for this position, and are long underway with implementing environmental administrative techniques to track performance on such aspects. If SKF had been passive, then discrepancies between the firm's objectives and the objectives attainable would have become a problem. Thus environmental management accounting innovations are adopted to close the gaps (the demand-pull explanation). Moreover, changes have undoubtedly taken place in scientific or technological knowledge, creating new environmental methods. These reveal new performance gaps, and, again, SKF and its competitors aiming for similar objectives (to improve their strategic positions) adopt such techniques to close these gaps (the supply-push explanation). SKF is an organization that freely chooses which control systems to adopt, and the controllers seem confident in the environmental methods' positive effects on both short-term and long-term financial aspects.

Secondly, the fad perspective explaining the ongoing integration of environmental aspects into management accounting systems at SKF stress how bandwagon behavior, which dictates that pressures to imitate others' adoption decisions increases with the number of adopters, is a possible reason why environmental methods are adopted at SKF. Many Swedish industrial firms communicate environmental performance and perhaps SKF once gave in to the strength of conformity pressures to follow. However, given that SKF has a proactive approach with industry leading initiatives such as SKF Care and BeyondZero at the core of their business model, it seems doubtful that the fad perspective is the explanation to SKF's adoption of environmental methods.

Thirdly, the forced-selection perspective stress that the powerful labor unions, which are known to have great influence on SKF, control sufficient power to dictate organization-wide adoption of environmental methods. Although there are labor union representatives on the board of directors, they have traditionally focused on pushing the workers' agenda. SKF Care involves the concept of Employee care in addition to the Environmental care, perhaps due to labor union representatives' influence. The powerful influences that the labor unions can exert when threatening general strikes are however likely not directed towards adopting or rejecting environmental methods.

Finally, the fashion perspective would stress the statements made by some of the controllers, as well as the CFO, in particular their call for credibility and standardization of environmental methods. They are open to be influenced or inspired by the so-called fashion setters, such as the academia or other 3rd parties specializing on certain methods. The fashion setters have power to influence SKF's adoption of environmental methods stemming from a capacity to inspire internal actors to trust their choices of methods and to imitate them. A challenge is to avoid the simplified and too generic versions of these methods. According to Abrahamson, outsiders tend to simplify methods, in particular when they have an interest to sell the solutions. Often, this leads to inefficient management accounting innovations, as they are not tailored to the organization's specific needs. Some of the interviewees mentioned that the customers have to trust the promised environmental performance, or else these arguments were meaningless in the pursuit of premium price. The most common answer to this challenge was thought to be standardized environmental methods. Mr. Swanström of ABB worked a lot with credibility, general acceptance, and relevant to business for environmental methods. The scientific base of the methods made them credible to the rest of the organization and that it helps if the methods have a general acceptance in society.

Burns and Scapens (2000) framework for the process of institutionalization in management accounting change distinguished between the institutional realm and the realm of action, which were interlinked by the transmission and transformation of rules and routines (see figure 1, theoretical framework section). The change to integrate environmental methods into management accounting systems could be viewed as a more or less ongoing process, where rules and routines are encoded from the institutional realm and then enacted by organizational members and gradually reproduced through their everyday actions and ultimately institutionalized, or taken for granted by some larger collective of actors. At SKF the institutional realm demands environmental performance. For example, legislative demand forces SKF to conform to certain environmental rules. Additionally, the importance of an environmental strategic position, as discussed above, makes actors within SKF encode rules and routines in order to influence action that will lead to the environmental strategic position. Some of these routines, such as the CO2 management system, influence managers and employees to act in certain ways. The process of integrating environmental aspects into management accounting systems has just started at SKF, and their ambition is get the environmental aspects to influence all key decisions. The outcomes of decisions based on environmental methods will, along the way, prove to be both satisfactory, and sometimes unsatisfactory. Thus organizational actors will adjust their rules and routines based on these outcomes, perhaps in incremental steps over a longer period of time (the so-called process of reproduction). The processes of integrating environmental methods into management accounting systems will likely undergo great changes from the initial proposed methods as various actors interpret the methods' outcomes in different ways.

As mentioned above, SKF's management accounting systems still have a long way to go before environmental aspects are fully integrated - controllers worked mostly with financial systems. However, environmental aspects were viewed as important operational aspects and acknowledged to lead to short- and long-term financial outcomes. Initiatives such as BeyondZero were evaluated on environmental key performance indicators. Thus the traditional balanced scorecard approach is currently taken as it is a management accounting system that balances financial and operational (non-financial) measures, using both quantitative and qualitative data as inputs (Kaplan & Norton, 1992, 1996, 2000). As revenues from the BeyondZero portfolio is expected to increase substantially, the sustainable balanced scorecard approach is increasingly used to manage the performance evaluation and allocation of resources. Environmental aspects such as CO2 emissions are measured on both investment and product-level. This gives managers and employees a dashboard of measures that are thought to be necessary to manage the firm towards future financial results and are thought to be increasing their control over the assets that drive the firm's market value. As discussed above, sustainability aspects such as environmental performance are now, more than ever, essential for long-term success of firms. The original balanced scorecard transcends the focus on financial perspective, and suggests that three additional perspectives are instrumental to achieving good financial performance (customer; internal processes; and learning & growth). The question is whether or not more key performance indicators are needed to achieve good environmental performance? If the answer is that more indicators are needed, then the next challenge for SKF will be to chose among Hansen's (2010) four approaches on how to integrate sustainability aspects into balanced scorecards (see table 4, theoretical framework section) – should they expand the number of perspectives (introduce the environmental perspective) or change the hierarchy of perspectives (e.g. environmental aspects that are place within e.g. internal processes are given the highest priority above financial aspects)? The answer might instead be that more key performance indicators are unnecessary to achieve good environmental performance - other forms of controls are more important. Controllers at SKF explained that they were not as comfortable with environmental methods as the financial ones in discussions with the engineers. However, they felt that they would like to be able to argue for

environmental aspects as another dimension to the financial dimension in investment discussions. The controllers' values seem, from the outside, to be in line with making sound environmental decisions. However, they were concerned that their knowledge in environmental aspects was not sufficient enough to take the initiative to argue for these aspects.

Balanced scorecards are generally limited to implementing a pre-thought-out strategy in the vertical top-down direction. Organizations such as SKF that have a proactive CEO at the top are perhaps inclined to chose that type of systems. A challenge will be to enable and encourage innovation and bottom-up business intelligence flows. Simply implementing a brilliantly looking strategy based on lagging indicators, such as the financial one's that the CEO is responsible for, could produce more harm in the long-term. Additionally, as one interviewee pointed out, another challenge is to coordinate information horizontally among firms in the entire value chain, as environmental aspects are everyone's concern (regardless of which organization one belongs to). Some of the environmental aspects might otherwise be hidden for the firms that singlehandedly tries to optimize their performance on certain environmental KPIs.

The cycle of encoding, enactment and reproduction may also be incomplete as certain environmental methods are abandoned or ignored and thus have little influence on the actions. At knowledge intensive firms like SKF, internal white-collar managers and employees come from different academic backgrounds such as engineering, natural science or business schools. The power struggles over resources, especially in major investment decisions, were often influenced by controllers when the financial aspects where discussed. Although it is important with a specialized workforce where individuals are experts in their own field, the environmental challenges seem to benefit from an understanding of its concepts by all of the decision-makers. Or else the environmental aspects risk not being raised at all, or ignored by the ones who do stress their importance. That would create decoupling, where rules are formally recognized even though their influence on everyday actions is limited. It is only when rules permeate actions and are widely recognized as the appropriate or legitimate way of doing things that we may speak of more firmly institutionalized action patterns. Ultimately, institutional rules are embedded in the management accounting systems. Routinisation is needed for such rules to influence the actual management accounting practices of the firm, which means that employees or managers must incorporate institutional rules into their sense-making (how they think) such that they come to shape their habitual action patterns.

At ABB, the major challenge was to make sure rules and routines, in the form of environmental methods, affect the actions so that ABB fully uses the space within the institutional realm. The society's incentive systems favored poor performance in CO2 at the moment. Mr. Swanström argued that ABB was way ahead of these institutional demands, proactively adopting environmental methods that ensure industry-leading actions on environmental aspects. Moreover, ABB tried to manage the level of competence in environmental aspects throughout the organization by assigning and educating country-level environmental controllers.

Conclusion

This paper supports a wider spread of knowledge on environmental aspects in society. Schools at all levels should put environmental aspects on their curricula with an equal status as natural science and business studies. In this way, future generations will accept the environmental dimension in addition to finance, quality or operational aspects working in industry. In the short-term, society and financial

markets must pressure firms to perform better and better on environmental aspects for the internal managers and employees to continue the developing and integrating environmental methods.

Integrating environmental aspects into management accounting practices is a process with many challenges. Firms following a stakeholder approach to their overall objectives and pursuing an authentic environmental strategy that reinforces their business models will initially be able to charge a premium for their products and services – at least SKF and Volvo Buses does. The actual implementation of the environmental strategy at SKF takes the form of the BeyondZero portfolio. Balanced scorecard and key performance indicators of environmental aspects, e.g. CO2 or energy use are increasingly being used. Environmental methods are foremost affecting operational personnel, working in e.g. production or specialized functions such as one of SKF's five business units, and not affecting the market-driven strategic segments such as SKF Railway. The controllers participating in the study were at the moment mainly using traditional management accounting systems based on financial data. They did however recognize the importance of environmental performance and seemed inclined to adopt environmental methods in the near future.

Organizations that are considering adopting or rejecting new management accounting innovations should be careful not to be persuaded by outside fashion setters offering oversimplified and generic solutions. There were many interviewees who called for more standardization in environmental methods. The end-result could lead to inefficient management accounting systems that are neither in line with the core business model nor any of the firm's unique aspects. SKF were argued to follow all four perspectives to certain extents. The efficient-choice perspective is in theory is the preferable one.

It can take considerable time for new methods to have a true impact on behavior and be accepted as management accounting practices. Simply pushing managers and employees to abide by new rules does not automatically mean that this will shape their actions. Lack of knowledge of environmental aspects prevented controllers from using environmental data as they worked with investment proposals. Decoupling can be a challenge, where rules are formally recognized even though their influence on behaviors is limited. Moreover, current management accounting systems that are primarily based on financial aspects are already firmly institutionalized in our society and in the practices of large public firms. This path dependency will take considerable time to break.

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