Jari Huikku

Design of a Post-Completion Auditing System for Organizational Learning

HELSINGIN KAUPPAKORKEAKOULU
HELSINKI SCHOOL OF ECONOMICS

W-462

Jari Huikku

Design of a Post-Completion Auditing System for Organizational Learning

Department of Accounting and Finance

February
2009

HELSINGIN KAUPPAKORKEAKOULU
HELSINKI SCHOOL OF ECONOMICS
WORKING PAPERS
W-462

HELSINGIN KAUPPAKORKEAKOULU
HELSINKI SCHOOL OF ECONOMICS
PL 1210
FI-00101 HELSINKI
FINLAND

ISSN 1235-5674
(Electronic working paper)
ISBN 978-952-488-312-2

Helsinki School of Economics -
HSE Print 2009

Design of a Post-Completion Auditing System for Organizational Learning

Jari HUIKKU
Helsinki School of Economics
Department of Accounting and Finance
Runeberginkatu 22-24
00100 Helsinki, Finland
jari.huikku@hse.fi

Abstract

The literature suggests that the major objective for a company's post-completion auditing (PCA) of capital investments is the enhancement of organizational learning (OL) for future capital investment. PCA scholars further propose that adequate content and communication of PCA reports play a major role in enabling OL. Nevertheless, there is little empirical research on the design of PCA systems in general, and on their communication aspects in particular. Consequently, this field study investigates whether or not the design of PCA systems provides a platform for OL. First, with the aid of Huber's (1991) categorization of OL constructs and the PCA literature, an OL-conducive PCA design was synthesized. It was then used as a benchmark for investigating PCA practices in companies. The empirical evidence comes primarily from the 14 PCA adopters, for which enhancement of OL is the dominant objective of their PCA. These adopters were identified during 49 face-to-face interviews conducted in the 30 largest Finnish manufacturing companies. The findings of this study suggest that PCA design, and specifically aspects related to a PCA report and its communication, can play a major role in facilitating or hindering the extent to which PCA enhances OL. Importantly, it appears that organizational-memory-related issues such as the inappropriate filing of and difficult access to PCA reports inhibit the effective transfer and sharing of investment experiences. Additionally, a lack of improvement proposals, failure to institute systematic follow-up, lack of interactive forums for the interpretation of results, and restricted dissemination of PCA reports seem to have a negative effect on learning potential. Furthermore, the findings support the contention that reliance on alternate methods of managing investment knowledge (e.g. utilizing central expertise and experienced internal resources) can diminish the willingness of smaller companies to develop PCA as an OL tool.

Key words: *Post-completion auditing; Post-auditing; Capital investment, Organizational learning; Management control system design; Field study.*

1. Introduction

This study addresses the relationship between the design of post-completion auditing (PCA) systems and organizational learning (OL). The PCA of capital investments involves a formal review of a commissioned investment project, focusing on a comparison between the pre-investment estimates and the actual achievements after completion (Huikku, 2007; Chenhall and Morris, 1993).[1] Accordingly, PCA can be considered as one formal control system within a company's total management control system package, which comprises various formal and informal controls (Otley, 1999; Malmi and Brown, 2008). There is a large number of companies conducting PCA in the Anglo-Saxon countries, and many companies in other countries have adopted PCA as well.[2] Research suggests that the company's major objective in implementing PCA is the enhancement of OL for future capital investments (Neale, 1989, 1994; Azzone and Maccarrone, 2001). OL is not merely the sum of individual learning in an organization; it is a process involving the sharing of knowledge, beliefs or assumptions among individuals, influenced by a broader set of social, political or structural elements (Marquardt and Reynolds, 1994). It is a process whereby an organization responds to changes in its environment by detecting errors and correcting them in order to maintain the central features of the organization (Argyris, 1990).[3]

Management control systems can play a pivotal role in facilitating or hindering OL (Kloot, 1997; Carmona and Grönlund, 1998). It has been suggested that PCA information

[1] This definition is in line with the PCA definition suggested by Gadella (1986), Neale (1991a); Pierce and Tsay (1992), and CIMA (2005, 60).

[2] Adoption rates reported in different countries: 1) In UK, 98% (Arnold and Hatzopoulos, 2000) and 79% (Neale, 1991b); 2) In USA, 88% (Farragher et al., 1999), 76% (Gordon and Myers, 1991) and 90% (Klammer and Walker, 1984); 3) In Norway, 41% (Neale, 1994); and 4) In Italy, 71% (Azzone and Maccarrone, 2001).

[3] Argyris distinguishes between two types of OL: single-loop and double-loop learning. Single-loop learning focuses on problem solving and does not address the reasons for the problems arising in the first place. In double-loop learning, organizations not only detect and correct errors, but also question the underlying policies and goals. In its ultimate form, double-loop learning may lead to the resolution of incompatible organizational norms by setting new priorities or restructuring norms, and to the creation of a new operational paradigm (see also Senge, 1990).

has the potential to aid a company in avoiding previous mistakes and in systematically identifying successful processes that can be repeated in future investment projects (Neale, 1989; Northcott and Alkaraan, 2007). According to Huikku (2008), companies perceive PCA to be relevant in a double-loop type of learning because it helps them address the reasons for problems arising in the first place. Specifically, PCA can aid companies in improving the accuracy of underlying assumptions and goals in their planning material (ibid.). In a similar vein, Chenhall and Morris (1993) suggest that PCA feedback can enhance managerial learning at the project definition stage, particularly in relatively certain operating situations, whereas environmental uncertainty can moderate learning. At the project definition stage, PCA feedback can potentially enhance the development of proposals for new projects, improve the understanding of key factors affecting investment projects, and develop knowledge related to strategy formulation (ibid.). Kolb (1984, p. 38) has emphasized the vital role of concrete experiences in the learning process. Furthermore, Mills and Kennedy (1993) maintain that PCA can be conducive to learning for capital investment processes in general – not merely for project-specific investment activities. PCA information may, for example, trigger improvements in capital investment procedures and instructions.

The effective reuse of knowledge assets that exist within a firm is essential to the realization of a competitive advantage (Teece et al., 1997; Jensen and Szulanski, 2007). Communication plays a major role, by enabling knowledge transfer and knowledge sharing (Ghoshal and Bartlett, 1988; Ghoshal et al., 1994; Tucker et al., 1996). Similarly, Garvin (1993) emphasizes the importance of the quick and efficient transfer of learning experiences as a prerequisite for OL. Consistent with this point, PCA scholars emphasize the fact that the appropriate design of PCA systems, particularly with regard to PCA reports and their communication aspects, is a prerequisite for effective knowledge transfer and sharing, and hence for organizational learning (Azzone and Maccarrone, 2001; Mills and

Kennedy, 1993). Commonly referred-to PCA design aspects are related to the selection of projects for PCA, timing of PCA, persons conducting PCA, responsibility for PCA, and the format and communication of a PCA report (see e.g. Neale and Holmes, 1991; Pierce and Tsay, 1992; Kennedy and Mills, 1993). In spite of the significant role that PCA design plays in enhancing OL, there is little empirical research addressing this relationship within companies – exceptions being Azzone and Maccarrone (2001) and Neale (1991a).

Based on their Italian survey, Azzone and Maccarrone (2001) suggest that the design of a PCA system is associated[4] with the main objectives set for it – organizational learning and decision-making support for current investments. Accordingly, companies have designed their PCA systems to achieve these OL benefits. They have found, for example, that responsibility for PCA appears to be more centralized in firms in which OL is cited as their most important PCA objective. Additionally, in a survey of UK companies, Neale (1991a) examined the association between the objectives and design of PCA on the one hand and the perceived benefits of PCA on the other. He suggests that benefits are associated with the degree of emphasis placed on the objectives (e.g. companies stressing OL-related objectives are more likely to reap the benefits of OL). Furthermore, he found that the companies selecting only the major investment projects for PCA were more likely to generate OL benefits than were the companies investigating all the projects.[5] Because none of these studies focuses on the relationship between PCA design and OL per se, however, our knowledge about this important relationship is in its infancy. *Hence, the purpose of this study is to examine whether or not the design of PCA systems provides a platform for organizational learning.* In addressing the design of PCA systems, this study

[4] It is worth recognizing that even significant positive associations (e.g. between aims and design or between design and PCA benefits) do not automatically imply an ideal situation, although it is reasonable to expect that they may imply reasonably well-functioning design patterns.

[5] Otherwise, he did not find significant correlations between OL benefits and (1) the timing of the first PCA, (2) the location of responsibility for PCA (local vs. centralized), and (3) the structure of the team conducting PCA.

focuses specifically on PCA reports and their communication aspects – an area that has been highlighted by scholars, but neglected by researchers.

First, drawing upon the PCA literature, and on Huber's (1991) categorization of OL constructs (knowledge acquisition, information distribution, information interpretation, and organizational memory), an OL-conducive PCA design was synthesized. Huber's comprehensive presentation of OL processes is particularly suitable for structuring studies if they cover all OL phases and concentrate on explicit knowledge, as is the case in this study. Nevertheless, I recognize that in addition to explicit knowledge, which can be explicated or formalized, tacit knowledge (skills and know-how) can play an essential role in organizational learning processes (Nonaka and Takeuchi, 1995; Polanyi, 1966). Huber's constructs have been used by management control system researchers for studying integrative strategic performance measurement systems (Chenhall, 2005), organizational memories in accounting consultation units (Salterio and Denham, 1997), and links between management control and OL (Kloot, 1997). As a second step, the compiled PCA design was used in this study as a benchmark for presenting and analyzing empirical findings. Because of the scarce literature in this field, the study can be considered predominantly explorative – a starting point for further research.

This paper contributes to the PCA literature by extending the discussion about relationships between the design of PCA systems and OL. Specifically, it covers aspects of information interpretation, information distribution and organizational memory that have been virtually neglected by previous researchers. Motivated by the recent call of Haka (2007, p. 723-4) to examine why PCA systems seem to be ineffective, the paper is an explicit attempt to investigate the relationship between ineffectiveness and PCA designs. According to Haka, PCA systems are ineffective if they cannot properly convey feedback about experiences of capital investment outcomes; consequently companies continue to fund underperforming projects. From a practical point of view, enhanced understanding

about the relationships between PCA design and OL may help companies to develop their PCA systems more effectively.

For the purposes of this study, I conducted 49 face-to-face interviews in the 30 largest Finnish manufacturing corporations. The primary interviewees were the most knowledgeable persons in each company. The interviews comprised two parts: a semi-structured interview and a structured questionnaire that was completed during the interviews. This paper specifically addresses 14 of the 16 identified PCA adopters: those that emphasize OL as their major objective for PCA. The focus of the study is on tangible capital investments such as factories, production lines, machines and equipment.

The findings of this study suggest that PCA design, and specifically issues related to a PCA report and its communication, can substantially facilitate or hinder the extent to which PCAs enhance OL. Importantly, it appears that organizational-memory-related aspects such as the inappropriate filing of and difficult access to PCA reports inhibit the effective transferring and sharing of investment experiences within companies. Additionally, lack of improvement proposals and their systematic follow-up, lack of interactive forums for interpretation of results, and restricted dissemination of PCA reports seem to have a negative effect on OL potential. Furthermore, it appears that reliance on alternate methods of managing investment knowledge (e.g. utilizing central expertise and experienced internal resources), in particular, can diminish the willingness of smaller companies to develop PCA as their OL tool.

Section two of this paper reviews the relevant OL and PCA literatures and presents a PCA design serving OL objectives. The third section describes the research method, and the fourth presents and discusses the empirical results. Section five offers concluding remarks.

2. An OL-conducive PCA design

In this section, I draw primarily on Huber's (1991) constructs of OL and on the PCA literature in order to synthesize an OL-conducive PCA design. This model serves as the basis of comparison in discussing the empirical results of this study. Huber suggests that OL processes consist of four constructs: knowledge acquisition, information distribution, information interpretation, and organizational memory. Knowledge is first obtained in a knowledge acquisition process, followed by the sharing of information from various sources and the creation of new information or understanding in an information distribution process. In the next step – the information interpretation phase – commonly understood interpretations are attached to information. Finally, in the organizational memory phase, knowledge is stored for later use.

Knowledge acquisition

PCA reports play a major role in communicating the results of PCA in an organization, and consequently enabling OL. In a PCA context, we can assume that knowledge acquisition occurs when a company searches for the knowledge that allows it to compile a PCA report. In Huber's terms, searching can occur in three forms: performance monitoring (i.e. measurement), scanning, and focused searching. In performance monitoring, a company evaluates the success of an investment by comparing and analysing the ex-post outcomes of an investment project with its ex-ante targets (Neale and Holmes, 1991). By scanning its environment for change, a company may find useful information for assessing the future viability of its investments (Daft et al., 1988). In a similar vein, by conducting a focused search of its internal or external environment, a company may obtain relevant information for a PCA report about problems, opportunities, and currently available options.

Essential aspects of PCA design to be considered at the knowledge acquisition phase are the selection of projects for PCA, the timing of PCA, the location of

responsibility for PCA, and persons conducting PCA (e.g. Neale and Holmes, 1990; Azzone and Maccarone, 2001). Regarding the *selection of projects for PCA*, Mills and Kennedy (1990) suggest that the greatest benefit can be achieved by focusing on major investment projects, making it worthwhile to include them in PCA (see also Neale, 1991a). This is especially true for projects that provide the company with substantial potential for learning – pilot projects and repetitive investments, for example. Project size is by far the primary selection criterion for PCA (e.g. Gordon and Myers, 1991; Pierce and Tsay, 1992), and few if any companies conduct PCA for all their investments (e.g. Ghobadian and Smyth, 1989; Neale, 1994). According to Kennedy and Mills (1993), size can be the only selection criterion, or it can be combined with an unexpected outcome or degree of risk in investments. *Accordingly, the literature suggests that for OL purposes, a company would select projects with a great deal of learning potential, such as repetitive, pilot and complex investments.*

The timing of PCA is essential – particularly if a company conducts only one PCA per project and uses it to assist decision making for current investments (Gadella, 1986). Neale and Holmes (1991) recommend that if a company's primary objective for PCA is to enhance learning for future projects, it seems sensible to postpone PCA in order to gain more comprehensive and accurate feedback about the success factors. Late timing can diminish the relevance of transferring PCA experiences for future projects, however, for such reasons as technological change. Furthermore, Neale and Holmes (1991) report that two-thirds of the companies they studied conducted their first PCA within one year of project completion, and only a minority of the firms undertook more than one PCA per investment project (see also Mills and Kennedy, 1993; Neale, 1994; Gordon and Myers, 1991). *Hence, the literature suggests that in order to satisfy its OL goals, a company would conduct PCA after, but not long after, the investment project has been stabilized.*

Mukherjee (1987) proposes that it would be appropriate for control purposes to keep the *location of responsibility*[6] *for PCA* at the corporate level if the divisions have been given a relatively free hand in the capital investment process. In larger companies, Scapens et al. (1982) and Corr (1983) discovered, PCA is more likely to be delegated to a company's divisions. Neale (1994) reports that about half the companies in the UK and Norway had delegated the responsibility for PCA to the divisional level; Italy had a smaller number of companies reporting divisional responsibility (Azzone and Maccarrone, 2001). Additionally, Azzone and Maccarrone (2001) report that responsibility for PCA seems to be more centralized in companies stressing OL as their PCA objective. *This implies that a centralized PCA responsibility (not in the investing unit) would better enhance the harmonization of PCA procedures and ensure the dissemination of investment experiences within the entire corporation or division*.

Researchers have different opinions about who would be the most suitable *person or team to conduct PCA*. According to one approach, objectivity can be achieved by using outside people or a team that has not been involved in the investment project (Gulliver, 1987). Other researchers (e.g. Dillon and Caldwell, 1981) contend that the compilation of a PCA report requires the contribution of people with detailed knowledge. Yet it could be difficult to obtain objectivity if people in the investing units were allowed to review their own investments. They could present the situation subjectively or even be tempted to utilize their information advantage to manipulate figures or exaggerate performance estimations, thereby downgrading the potential for PCA reports to contribute to OL. In practice, the persons and teams conducting PCA appear to vary widely among firms, although controllers in investing units are reported to be the key resources (Kennedy and Mills,

[6] The persons or teams responsible for a PCA system have ownership of PCA activities and are in charge of tasks such as the development of a PCA system and the general functioning of PCA activities (providing policies, giving instructions and ensuring that companies adhere to them). Furthermore, such tasks may include the selection of investments to be included in PCA, the selection of PCA auditors, and the checking of draft PCA reports.

1993; Azzone and Maccarrone, 2001). Additionally, Farragher et al. (1999) report that there are few companies in which PCA is conducted by persons or teams with no prior involvement in the project. In summary, it seems that it is not critical if a PCA auditor comes from the investing unit or outside the firm, provided that the quality of PCA can be ensured. *Hence, in designing an OL-conducive PCA design, it would be relevant to connect people from the investing unit with outside persons or teams in order to conduct PCA.* In practice, this could occur, for example, by letting outside persons or teams comment on the draft PCA report made by the investing unit or vice versa.

Information distribution and interpretation

Information distribution is a process by which an organization shares information among its units and members (Huber, 1991). In this phase, it is critical to OL that the units possessing information and the units requiring this information have a high probability of finding each other quickly and easily (ibid.). Widespread distribution of information in an organization leads to more broadly based OL (Huber, 1991; Garvin, 1993). In the information interpretation process, distributed information is given one or more commonly understood interpretation(s) (Huber, 1991; Daft and Weick, 1984). Interactive communication (specifically, managerial conversations) constitutes a base for generating meaning for accounting information, and is therefore a critical precondition for OL (Jönsson, 1996; 1998; see also Simons, 1990; 1995). Widely differing interpretations of the same data may hinder an organization from developing shared meanings, which may in turn result in friction and reduced potential for organizational learning (Scapens and Roberts, 1993).

Information distribution and interpretation begin when PCA auditors make their reports. Nevertheless, information interpretation has been investigated in this study, as it occurs in major presentation forums of PCA results such as executive group meetings.

In examining information distribution, the paper focuses on dissemination of the final PCA reports after they have undergone the interpretation processes in presentation forums. This approach is consistent with Chenhall's (2005) study, which presents distribution aspects after interpretation. Because of the intertwined characteristics of information distribution and interpretation phases, I present them under a common heading.

As for the information distribution and interpretation phases, the main issues examined in this paper are *the content of a PCA report,* its presentation forum, and dissemination. The prerequisite for ex-post performance evaluation is the existence of documented investment appraisal material and its availability to PCA conductors. Additionally, using the same ex-ante and ex-post capital budgeting calculation methods enables required comparisons. Farragher et al. (1999) report, however, that companies do not always use the same methods. A company can consider various aspects of the content of a PCA report:[7] (1) the language used; (2) a standard versus non-standard format for reporting; (3) an analysis for both monetary and non-monetary targets; (4) ex-post calculations, including or excluding future estimates; (5) inclusion of detailed ex-post calculations; and (6) proposals for action (suggestions, helpful hints, lessons learned). Although it is likely that proposals can be conducive to learning, few PCA reports include proposals (Azzone and Maccarrone, 2001). Even when they do include a proposal, few companies have a formal mechanism for following up (ibid.).

Based on literature on the content of PCA reports*, it is suggested that companies would use the same ex-ante and ex-post capital budgeting calculation methods.* Hence, the comparisons would be based on updated ex-ante calculations, or at least on the progress of its main components. *Furthermore, PCA reports would include detailed comparisons of these calculations and comments on the achievement of objectives*. A lack of these factors

[7] See e.g. Ghobadian and Smyth (1989), Mills and Kennedy (1990; 1993), Azzone and Maccarrone (2001). Additionally, e.g. Mukherjee (1988) and Neale and Holmes (1991) have presented models for PCA reports.

can reduce reliability and understanding of ex-post calculations and their underlying assumptions, thereby hindering OL. *Additionally, common corporate language and standard format would be used for PCA reports.* Especially in multinational companies, the choice of language can be important from an OL point of view. Standard format can be expected to facilitate knowledge transfer by ensuring more effective retrieval of required data. *In particular, reports would include proposals for future capital investing.* Proposals can also be presented orally elsewhere, but if they do not exist in writing somewhere, there is a risk of losing important information and feedback.

PCA researchers have almost totally neglected to address the role of a *presentation forum of PCA reports* in enhancing OL. Nevertheless, Azzone and Maccarrone (2001) report that it is typical to have common meetings of PCA auditors and other staff involved in the investment process, in which PCA results are discussed and potential actions are implemented. A common forum can be valuable for three reasons: for disseminating knowledge among the attendees and for facilitating the interpretation of the results and the generation of shared understanding. A common forum can help to confirm that the results and proposals in a final PCA report represent shared understanding in an organization. Without a forum, the readers of the reports may become suspicious about the reliability and general acceptability of the reports; relevant proposals can be omitted, for instance. *In order to enhance OL, then, it seems reasonable to suggest that companies would have a forum in which interactive discussions and presentations of PCA results occur.*

The dissemination of PCA reports has received little attention in previous empirical PCA studies, although there are exceptions. Mills and Kennedy (1993) emphasize the importance of effective dissemination of reports to ensure enhanced organizational learning, and Ghobadian and Smyth (1989) report that it is common to disseminate PCA reports to persons responsible for initiating, planning, and implementing the project. Yet, according to Kennedy and Mills (1993), the distribution of final PCA reports tends to be

relatively limited, and routine distribution to other divisions is rare. In fact, Azzone and Maccarrone (2001) suggest that companies pay little attention to the dissemination of PCA results. *In order to ensure feedback for future investments, then, it is suggested that companies would disseminate PCA reports to at least to everyone involved in planning, approval, implementation, and PCA phases of a reviewed investment project.*

Organizational memory

Walsh and Ungson (1991, p. 61) advance the notion that organizational memory (OM) in its most basic sense refers to stored information from an organization's history that can be brought to bear on present decisions. They maintain that large companies often repeat mistakes made in the past because their OM does not function properly. Turnover of personnel (Levitt and March, 1988; Croasdell, 2001) and organizational forgetting (Carmona and Grönlund, 1998) have been pinpointed as the major threats for losing lessons of history.

In a broad sense, OM comprises individual memories, organizational culture and structures, standard operating procedures, internal and external archives, and workplace ecology (Walsh and Ungson, 1991; Ackerman, 1994). Advanced information technologies make it easier to share and disseminate explicit knowledge within a company (Huber, 2001; Croasdell, 2001). PCA researchers have virtually neglected OM issues in their studies. In this study the investigation of OM is primarily focussed on the storage and retrieval of PCA reports – the explicit PCA information that companies possess in their internal archives and databases. *In order to ensure OL, it is suggested here that companies would have databases or sets of archives for PCA results, their existence would be widely known, and relevant persons could conveniently retrieve PCA data.*

The synthesized OL-conducive PCA design is summarized in Table 1. This design profile is used as a benchmark to empirically investigate PCA designs in the companies.

Table 1: The OL-conducive PCA design

OL phases/design properties	Proposed criteria
Knowledge acquisition:	
Selection of projects for PCA	- repetitive investments - pilot investments - complex investments
Timing of PCA	- after, but not long after, an investment is stabilized
Responsibility for PCA	- head office level (division or corporation), not investing unit
PCA auditor	- can be from investing unit or outside (both expected to be involved in making PCA reports)
Information distribution and interpretation:	
Content of PCA report	- the same capital budgeting calculation methods used ex ante and ex post - detailed comparisons of ex-ante and ex-post calculations - comments on the achievement of objectives - common corporate language - standard format - proposals for future investing
Presentation forum for PCA reports	- at least one formal forum for interactive discussion and presentation of the reports
Dissemination of final PCA reports	- extensive dissemination: at least to all people involved in the project (planning, approval, implementation, PCA)
Organizational memory:	
Archiving and filing of PCA reports	- widely known archives or databases exist - relevant persons have convenient access to reports

3. Research method

Data for the empirical analysis were gathered between 2002 and 2004 from the 30 largest Finnish manufacturing corporations[8] through 49 face-to-face interviews. The primary interviewee – the person considered to be most knowledgeable about the issues investigated

[8] Ranked according to turnover (*Talouselämä* 24.5.2002), as in many of the other studies on capital investment practices and PCA. *Talouselämä* is a journal that annually lists the Top 500 companies in Finland.

in each company – was identified through the company's Internet home page, press releases, seminars, phone calls to the company and tips from colleagues from other companies. The primary interviewee was typically in charge of finance (the CFO), technology, production or investments, and simultaneously responsible for capital investing policies in corporate management or major divisions. Every person who was approached agreed to be interviewed. The interviews were conducted on the interviewee's premises, the average duration of the interviews was approximately two hours, and all interviews but one were tape-recorded. In some cases, the interviewees were contacted later by e-mail or telephone in order to check my interpretations of their answers or to obtain further details. The anonymity of participating companies and interviewees has been preserved in the description of this study.

Based on information obtained during the interviews, and according to the definition of PCA used for the paper, 16 of these 30 companies were identified as PCA adopters.[9] Among the 16 adopters, two did not regard the enhancing of OL to be the major reason for conducting PCA. This paper specifically addresses the 14 PCA adopters (22 interviews) that regarded enhancing organizational learning as their major objective for PCA. These 14 adopter companies represent seven sectors of the manufacturing industry: paper (4 companies), metal (4), food processing (2), building materials (1), chemicals and plastics (1), energy (1), and other (1). In 2001, the median net sales were €2.7 billion, and the net sales of the largest company were €13.5 billion. The largest absolute amount of tangible assets was €12.3 billion, the median being €1.2 billion. Gross investments were between €33 million and €3.9 billion; 13 of these 14 companies had international operations, such as major production facilities.

[9] In two conglomerates consisting of largely independent businesses, different policies for PCA were found. In both companies, the larger divisions were PCA adopters, and they were chosen to represent the whole company.

PCA studies have been conducted primarily with postal survey methods. That, in fact, had been my original intention – to send a postal survey to potential respondents in a larger number of companies. But the early contacts with the companies revealed that respondents had a difficult time distinguishing among such concepts as pre-audit, monitoring and PCA, which would have jeopardized the reliability and validity of the findings. It appeared that face-to-face interviews would have to be conducted in order to clarify these issues as they arose; provide detailed definitions; pose further questions; return to previous answers; and provide real examples of PCA reports, including communication aspects. Because the purpose of the research was to obtain a wide and comprehensive picture of the topic addressed, however, a case analysis examining few companies would not suffice. Consequently, a cross-sectional field study somewhere between a broad-based survey and in-depth case study was the method chosen (Lillis and Mundy, 2005). Although the face-to-face approach adopted in this research had the disadvantage of restricting the number of companies studied and the consequent generalization of results, it significantly increased the reliability and validity of the study. To the best of my knowledge, this is the most extensive PCA study using face-to-face interviews.

The face-to-face interviews consisted of a semi-structured interview and a structured questionnaire completed during the interview. The main structure of the interview was as follows (see Appendix A): general; capital investment process; monitoring; PCA; and organizational learning with regard to capital investments. The questionnaire, developed with the aid of prior normative and empirical PCA studies, comprised 44 factual and attitudinal questions about PCA. The 27 factual questions relevant to this paper related to the design of PCA systems, and covered the type of projects selected, the format, who conducts PCA, who is responsible for them, when and how frequently they are conducted, how the results are communicated (presented, disseminated, and archived), and how the PCA systems will be developed in the near future. In the

attitudinal questions pertinent to this paper, interviewees were asked to indicate on a 5-point Likert scale[10] the significance of seven potential objectives for PCA and their perceived benefits. The objectives and benefits suggested were related to performance measurement, decision making for corrections and abandonment, OL for projects and process development, the integrity of investment appraisals, and staff evaluation (Neale, 1989 and 1994; Mills and Kennedy, 1993; Azzone and Maccarrone, 2001). The questions were closed-ended, but most were followed by a blank space, allowing additional information to be included. Importantly, in addition to merely answering to the formal questions, the respondents were encouraged to explain their answers, and to discuss the topics addressed. Additionally, in order to obtain a comprehensive picture about OL related to capital investments, respondents were asked to rate ten options on a 5-point Likert scale and to discuss them in order to illustrate how their company manages capital investment knowledge. Interviewees also showed the researcher their PCA reports.

4. Empirical results and discussion

As previously mentioned, and consistent with the PCA literature (Neale, 1989, 1994; Azzone and Maccarrone, 2001), most of the PCA adopters (14/16) regarded the enhancing of OL as the predominant objective for conducting PCA;[11] consequently, the empirical part of this paper focuses on these 14 companies. The PCA designs of these 14 adopter companies (Companies A-N) are summarized in Appendix B, and presented in greater

[10] In the text I use the following terms to indicate the ratings in the attitudinal questions: insignificant (1), slightly significant (2), moderately significant (3), significant (4), and highly significant (5).

[11] Performance measurement was, in fact, rated as the companies' most important aim at the aggregate level. Nevertheless, it appeared in further discussions that the companies considered it, in practice, to be a core function of PCA – facilitating achievement of other objectives, rather than a distinct aim. Enhancing the integrity of investment appraisals was also highly rated, but it appeared in further discussions that most of the companies referred to benefits related to OL, rather than to control benefits. In other words, their objective was to learn to make more realistic appraisals. PCA aims of assisting decision making for corrections and staff evaluation were rated at a low level. Additionally, all interviewees believed that assisting decision making for abandonments is an insignificant aim for PCA. Two PCA adopters emphasized the enhancing of the integrity of their investment appraisals as their major PCA aim. In both companies, upwardly biased cash flow expectations in many past projects appeared to be the major driver for this emphasis.

detail in Appendix C. The important role of OL as an objective for PCA was also illustrated in numerous comments:

> *We emphasize in our organization that our number one aim for the PCA is to gather feedback in order to accumulate experiences and learn for future projects* (Senior Vice President, Investments, Company A)
>
> *Clearly, our objective for conducting PCA is to enhance organizational learning.* (Executive Vice President of Corporate Strategy and Business Development, Company B).
>
> *The anticipated value added from conducting PCA comes from learning and transferring this experience to future projects. No doubt about this* (CFO, Company F).

Whether or not the companies' PCA designs were in line with the synthesized OL-conducive design is the next topic of analysis. First, the findings of the PCA designs are investigated from the point of view of four OL constructs (Huber, 1991). The firm-specific PCA designs are addressed next, followed by a discussion of whether or not existing alternate methods of managing capital investment knowledge may discourage the development of PCA designs. Finally, the findings and discussion are synthesized.

4.1 Knowledge acquisition

Organizations acquired the information for PCA reports primarily by searching within and outside the organization. As for major investments, the companies scan their environment to find information for assessing the viability of their completed investments. Focused search is used to obtain information about problems, opportunities, and alternatives for compiling PCA reports.

The selection of projects for PCA, timing of PCA, location of responsibility for PCA, and persons conducting PCA are the design properties to be addressed at the knowledge acquisition phase. All the companies studied used size – the amount of money invested – as the primary criterion for selecting capital investments for PCA, and a few

companies also selected all their strategic and underperforming investments. The companies conducted their PCAs between 6 and 36 months after completion of an investment, with only one PCA round per investment typically conducted. All the companies had a centralized responsibility for PCA, whether at the corporate or divisional level. Corporations consisting of highly diversified divisions tended to delegate PCA responsibility to their divisions.

The companies studied had many different variations for the PCA audit, ranging from a self-reviewing investing unit to an independent auditor with no investing unit affiliation. None of the companies had a full-time resource devoted to PCA, and most of them relied on the investing unit to conduct the audit. These companies explained their choice by emphasizing responsibility (the difficulty of presenting their own bad investments at a common forum), continuity (avoiding the loss of relevant information during the planning and implementation of PCA), and learning by reflecting on one's own activities. Executive Vice President of Corporate Strategy and Business Development in Company B explained the company's choice to let the investing units conduct PCA themselves:

> *We think that the managers in investing units learn themselves [about their investments] and can make better investment appraisals and implementations in the future.*

The companies in which investing units undertook self-review enhanced the objectivity of PCA reporting by having someone outside the investing unit comment on draft reports before their presentation and distribution. The outside resources could, for example, be the persons responsible for PCA at the divisional or corporate level. The achievement of set objectives could be relatively transparent. Whether the auditors were internal or external, controllers in the investing units appeared to be the central source of PCA information (e.g. actual figures, estimates, explanations for gaps, and learning

experiences). The controllers were considered to be relatively objective; they were not expected to manipulate the figures because they were commonly expected to report to their superiors in the finance and accounting function outside the investing unit. As Senior Vice President of Corporate Strategy, Investments and Business Planning for Company B explained:

> *The plant director is responsible for making a PCA report for his own investment. However, in practice we have the plant controller there as a neutral, objective resource in making it.*

In less than half of the companies, PCA was conducted not by the investing unit but by outside resources: controllers from headquarters, a senior vice president (investments), members of the divisional investment service function, or controllers from other divisions. Representatives of the investing units had the opportunity, however, to suggest alterations to the draft PCA report. This type of procedure was seen to minimize misunderstandings and strengthen the feeling that the report represented the common view held in the company. As noted by Senior Vice President, Investments, Company A:

> *Always, after having completed a [draft] PCA report, I distribute it to the investing party to verify whether or not I've understood the case correctly, and to ask them to make their additions.*

In summary, with regard to the knowledge acquisition phase, it appears that the companies have designed their PCA in accordance with the synthesized, OL-conducive PCA design. They appeared to cover most of the projects with a great deal of learning potential (i.e. repetitive, pilot, and complex investments) by including the major investments in PCA. PCA occurred after, but not long after the investments were stabilized, so as not to jeopardize the relevance of PCA experiences for future investments. The companies had the centralized location of responsibility for PCA. The centralized location is appropriate in enhancing the harmonization of PCA procedures and facilitating the

dissemination of investment experiences within a company. Additionally, in each company, both the investing unit and outside staff contributed to PCA reports, thereby ensuring their quality.

4.2. Information distribution and interpretation

The aspects related to the content of PCA reports, their presentation forums and dissemination play a major role in information distribution and interpretation phases. Regarding the content of PCA reports, all 14 companies documented investment appraisal material, and this material included monetary and often non-monetary objectives. Additionally, all the companies based their ex-post calculations on analyses of the same key components as presented ex ante, or even updated the original calculations with actual figures and future estimates. A manager in Company E justified its choice to focus on actual figures rather than presenting new estimates:

> *We don't want to give managers the possibility to focus the discussion on unsure future cash flows; we want to stick to cold facts.*

Most but not all of the companies included detailed calculations in their PCA reports and verbally commented upon the achievement of the objectives. In the multinational companies, PCA reports, or at least their summaries, were written in English, thereby facilitating communication. In all the companies, the format of the PCA report was, at least to a great extent, harmonized by PCA instructions or practice. Although the use of a standard format seems to be OL-conducive, because it ensures more effective retrieval of data, only a few companies used a standard format for reports. It also seems that PCA conductors sometimes feel free to modify reports or to neglect essential points if no ready format is introduced. Less than half the companies always or often included proposals in their PCA reports, and in few companies were proposals systematically followed up and

used in future investments. In Company A, the Senior Vice President of Investments was in charge of these activities:

> *I am the one who systematically controls that our organization takes the proposals into consideration when new investments are planned.*

It appeared that almost all the companies had at least one formal forum, and typically several forums for presenting PCA results. Various formal forums were mentioned as being the primary one (i.e. the place where the results were presented and discussed for the first time): executive group meeting at the level of the corporation, division, or profit centre; a separate investment team at the corporate or division level; the corporation's technology and operations directors' meeting and the corporate controllers' meeting. In secondary forums, such as the board of directors' meetings at the corporate or divisional level, PCA results were typically brief reports presented along with many other issues on the agenda. The frequency of presenting reports at the primary forum varies from company to company. One obvious reason is the number of major investments.

Most of the companies did not have a primary interactive forum for presenting the PCA results. The dominating non-interactive forums in these companies were executive group meetings, which characteristically featured one-way reporting of performance measurement issues to decision makers rather than an interactive discussion of issues for purposes of organizational learning. As one Company E manager in charge of investment coordination stated:

> *In fact, we do not have any forum where we would reflect what we have learned.*

The other companies had a primary interactive forum for presenting and discussing the results, which was more likely to consist of the people who were planning and implementing investments (members of the investment team and the technology & operations directors' and controllers' meetings). In this type of forum, apart from

performance evaluation, interactive discussion and reflection regarding investments appeared to receive more attention. As Senior Vice President, Investments, in Company A emphasized:

> *We have this Investment Prioritization Team. It's a presentation and interactive discussion forum, not only for investment proposals, but also for PCA reports.*

In a similar vein, Company C's Director of Technical Development said:

> *We have a monthly Development Meeting, where we go through all kinds of investment-related issues. Three times a year we present and discuss PCA reporting material received from the investing units. In this meeting we have operational, technical and financial people present. The idea is to understand and document what has happened, and consequently learn for the coming projects.*

In all the companies, the divisional or corporate executive group meeting, together with the managing director, examined major investments and approved them. Additionally, the board of directors also had to approve investment appraisals for the largest investments and typically for all the strategic investments as well. As Company C's Director of Technical Development explained:

> *The [PCA] reports are automatically disseminated to the approvers. Thus, it depends on the investment whether it is reported only at the executive group meeting or also at the board of directors' meeting.*

Nevertheless, not all the companies reported the success of the capital investments to the executive group or the board of directors. In fact, less than half the companies reported PCA results to their board of directors. Additionally, none of the companies routinely distributed PCA reports across the divisions or to internal auditing. It appears, however, that people closely involved in the planning and implementation phases, such as the management of the investing unit and the project managers in charge of the investment, obtained the PCA reports.

In summary, the contents of the companies' PCA reports were consistent, to some extent, with the synthesized, OL-conducive PCA design. The 14 PCA adopter companies

typically used the same ex-ante and ex-post capital budgeting calculation methods. Additionally, reports included detailed comparison calculations and comments on the achievement of set goals, and common language was used. Yet contrary to the design profile, the use of a standard format for PCA reports and inclusion of explicitly expressed proposals and their systematic follow-up appears to have been rare. As proposed in the OL-conducive PCA design, a standard report format would facilitate knowledge transfer by ensuring more effective retrieval of data. In companies not using a standard format, however, it appeared that PCA instructions or practice had significantly harmonized the format. Yet, there seems to have been a risk that PCA auditors modified reports or neglected essential points if no ready format was introduced. Without explicit proposals, the readers of the reports may find it ambiguous to decide what lessons they were expected to learn that would be of assistance in future investing. Furthermore, according to the proposed OL-conducive PCA design, companies would have a primary interactive forum for discussion and presentation of reports. Although almost all the companies had a formal forum, this forum was usually, however, not intended for interactive discussion and interpretation, but for reporting performance measurement issues. Moreover, it was expected that the dissemination of final reports would cover, at a minimum, everyone involved in the project. The reports were distributed to people involved in the planning and implementation phases; whereas all the companies did not automatically communicate PCA results back to the ultimate approvers of investments – the executive group and board of directors.

4.3. Organizational memory

Only two of the companies had a widely known archive or database for storing PCA reports (i.e. OM) from which relevant persons could conveniently retrieve needed information. The

Senior Vice President of Investments in charge of capital investments for Company A described their system:

> *The PCA reporting is made in Lotus Notes environment [Company A's intranet]. We have about 200 reports there, made in standard format by using templates. The PCA reports are one part of the documentation for each of the projects. The files include all material related to that project – all the planning material and links to all kinds of helpful documentation and material, for example. Reports are available for all those who want to look at them. I give personal reading rights for relevant persons. I mean people who are involved in this capital budgeting process. At the moment, that's about 100 people working with investments: managers and directors of operative units who are the decision makers and the superiors of the people I just mentioned. I'm the only one who has editing rights, so they can't change their reports later. In practice, when somebody is planning a new investment, I automatically forward them links to similar projects and emphasize that they must keep two things in mind: there is a lot of knowledge in Lotus Notes, and that I am available for any questions.*

Similarly, Vice President of Finance and Administration in Company M said:

> *We save all the PCA reports in a common hard disc [in LAN]. Our logic is to provide reading rights to relevant persons.*

Most of the companies had no registers or files of old PCA reports or easy access to them. Consequently, PCA information was not conveniently retrievable.

One reason for restricting the dissemination and availability of PCA reports seems to have been their perceived sensitivity. As one Company H manager who was coordinating capital investment and PCA activities in the corporation commented on the accessibility of their PCA reports:

> *We have a policy to keep unit-specific information available to only that particular unit. That's the main reason we don't have these [PCA] reports in our Lotus Notes [their intranet]. Without the permission of the investing unit, you have no authority to see the material. If people want to see each other's material, they contact me – not the investing unit directly.*

It appears that the companies had typically not arranged their OM according to the synthesized design profile for an OL-conducive PCA; they had no easily accessible

archives or databases for PCA data from which relevant people could conveniently retrieve valuable learning experiences. Additionally, company policies seemed to restrict managerial access to PCA information.

4.4 Company-specific PCA designs

The company-specific PCA designs are summarized in Appendix B. Based on the synthesized, OL-conducive PCA design, 17 criteria have been presented. One company fulfilled a maximum of 15 suggested criteria and two companies fulfilled only eight. Interviewees from the high-scoring companies – specifically Companies A and M, which had the most sophisticated organizational memories for PCA data - were more likely than other interviewees to say that they reaped OL benefits, and less likely to say that they needed to develop their PCA systems. As Senior Vice President of Investments, Company A commented:

> *We have no pressure to change our PCA systems. We are satisfied with it as an OL tool.*

Company A fulfilled all the criteria presented, except for the presentation and dissemination of PCA results to the board of directors. In addition to these deficiencies, Company M had no formal follow-up procedures for proposals made in the PCA report. Obviously, these criteria were not seen as being critical.

Almost all of the other 12 companies recognized the need for improvement to their PCA systems to better facilitate OL. The needs were clearly focused on improved communication, and, as illustrated by the quotations, particularly on organizational memory.

> *The PCA reports are enclosed as appendixes in the minutes of the development meeting. We do regret that we don't have any common database or register for them. We're thinking about it. Now we have to go through the minutes in order to find information* (Director of Technical Development, Company C).

With respect to OM, a CFO from Company F said:

> *Unfortunately, we don't have a register for conducted [PCA] reports. It's a clear deficiency. We don't know what kinds of reports exist and where to find them.*

In a similar vein, Senior Vice president of Corporate Strategy, Investments and Business Planning, Company B explained:

> *In fact, we are in the process of transferring these PCA reports to intranet. It will bring information nearer to those who need it all over the corporation. At the moment, the knowledge is not available to everybody. It accumulates here at the corporate staff. Hence, we have to develop our system so that the lessons learned can be effectively transferred in the corporation.*

The companies with more sophisticated PCA designs seem to have better achieved the OL benefits, and to be more satisfied with their existing PCA systems. Why, then, did the companies with less sophisticated PCA designs not necessarily develop their systems accordingly? The degree of sophistication of PCA design in this limited sample does not seem to be associated with organization structure, technology, or environmental context. Rather, it seems that the larger the company (as measured by sales volume and tangible assets), the more likely it is to employ a more sophisticated PCA design. Of the seven largest companies as measured by sales volume and absolute amount of tangible assets, six were among the seven highest scorers. Hence, it is reasonable to infer that companies with a critical mass of capital investment paid more attention to the development of sophisticated PCA designs and vice versa. Consistent with previous findings suggesting that more sophisticated management control systems are used in larger companies (e.g. Merchant, 1981; Waterhouse and Tiessen, 1978; Chenhall, 2003; Al-Omiri and Drury, 2007; Huikku, 2007), the design decisions seem to have been based on cost-benefit thinking (cf. Granlund, 2001).

4.5 Alternate methods to manage capital investment knowledge

The empirical data shows that PCA is not the only option for the companies to manage their capital investment knowledge. They use typically many simultaneous means. Utilizing central expertise located at the divisional or corporate headquarters level was considered "significant" or "highly significant" in all 14 companies. As Company J's Executive Vice President of Strategy and Business Development said of the centralized investment department:

> *When you go to the office of the investment team leader, he knows everything and he can help you.*

The utilization of knowledge located within an investing unit (factory, profit centre) was considered "significant" or "highly significant" in almost all the companies. In practice, this means that experienced people within the organization would be connected to new investments. Senior Vice President of Corporate Strategy, Investments and Business Planning in Company B commented about the importance of using the experienced people:

> *This is really important. Knowledge is pretty much transferred via people. In practice the senior ones will be connected to the new [investment] projects. This is the best way to transfer knowledge, directly from people to people.*

Specifically, the companies emphasize the importance of personal contacts in transferring tacit knowledge that is challenging to transfer via reports. As Vice President of Operations and Logistics in Company D stated:

> *We do not have any register or archive for PCA reports, but people in the organization know that they can ask me, if they need more information.*

Almost all the companies used other means for administrating capital investment knowledge: discussions with persons involved in previous projects, examination of documentation from the previous projects, transfer of experts from other locations in the company, assistance from other locations in the company, and reliance upon external suppliers or consultants. Some companies acquired relevant knowledge by taking reference

visits to other companies, sending partners abroad, utilizing steering group experience and networking across their companies.

The use of PCA and alternate methods appear to have complemented each other in enhancing OL (e.g. Fisher, 1995). Their distinct advantages provided their raison d'être. With the aid of the formal PCA, a company can more systematically analyze and interpret the progress of an investment project and obtain feedback for future investing. As Company C's Director of Technical Development commented:

> *The bigger and more strategic investments we are talking about, it is not only the physical implementation and production, but there are a lot of other things. If these projects were not mirrored by this kind of formal PCA, it would be hard to understand what has really happened. For smaller and easier investments, you can see the hard facts elsewhere.*

On the other hand, the companies emphasized the importance of personal interaction in transferring and sharing such tacit investment knowledge as skills and know-how (Nonaka and Takeuchi, 1995; see also Zander and Kogut, 1995).

Contrary to the proposed OL-conducive PCA design, the approvers of investments (e.g. the board of directors) did not automatically receive formal PCA feedback in all the companies. Rather, they obtained feedback from the investments with such methods as presentations, discussions, site visits, management letters, and other reporting. Another probable reason for boards of directors not requesting PCA reports may have been their approach of relating the success of the entire company to its capital investment activities (Huikku, 2007) – assuming that the performance indicators (e.g. profit, cash flow, ROI, and EVA) reveal whether or not the major investments have been successful.

In summary, in parallel with the smaller size of a company, the reliance on existing alternate methods of managing capital investment knowledge seems to discourage companies from developing their PCA systems. Consequently, the smaller companies with less capital investment paid little attention to the sophistication of PCA design, because

their managers perceived that their less sophisticated PCA, combined with the package of various methods, provided sufficient OL performance.

4.6 Synthesis

With the aid of Huber's (1991) categorization of OL constructs and the PCA literature, this paper began with a theoretical section synthesizing an OL-conducive PCA design. In this empirical results and discussion section, the design was used as a benchmark for addressing the question of whether or not the PCA system designs provided a platform for OL.

The findings provided support for prior empirical research concerning many aspects of PCA designs. It appears that the major selection criterion for PCA was project size (Pierce and Tsay, 1992; Neale and Holmes, 1991) and that the companies did not typically select all of their investments for PCA (Ghobadian and Smyth, 1989; Gordon and Myers, 1991; Neale, 1994). PCA was typically conducted within one year after completion of an investment project, and only a minority of firms in this study undertook several PCAs (Neale and Holmes, 1991; Mills and Kennedy, 1993; Neale, 1994). The controllers in investing units turned out to be key resources for PCA reports (Kennedy and Mills, 1993), and persons or teams with prior involvement in the project often conducted PCA (Farragher et al., 1999). A systematic inclusion of development proposals in PCA reports and their follow-up was more the exception than the rule (Azzone and Maccarrone, 2001). The usual method was to distribute PCA reports to the people responsible for initiating, planning, and implementing the project (Ghobadian and Smyth, 1989), whereas distribution to other parties (e.g. other divisions, and internal auditing) tended to be limited (Kennedy and Mills, 1993).

Scapens et al. (1982) and Corr (1983) have suggested that responsibility for PCA is more often delegated to the divisional level in large corporations. Yet in these 14 companies studied, the size of the company did not have an impact on the locus of

responsibility. Instead, it appeared that the corporations with highly diversified divisions had a tendency to delegate PCA responsibility to its divisions.

Compared to the OL-conducive PCA design, the companies in this study appeared to fulfil the criteria for knowledge acquisition: the selection of projects, timing, location of responsibility for PCA, and PCA auditor. Fulfilment of these criteria appears to be critical to a functioning PCA system. Instead, with regard to information distribution and interpretation and organizational memory, the PCA systems did not usually fulfil the proposed criteria. The major deviations were related to communication of PCA reports and particularly to issues of organizational memory. Few companies had easily accessible archives or databases for PCA data from which relevant persons could conveniently retrieve valuable learning experiences. Consequently, companies may repeat past mistakes or, at a minimum, may search for the same data again (Walsh and Ungson, 1991; Huber, 1991).

Few of the companies regularly included proposals for future capital investments in their PCA reports. Systematic follow-up of the realization of proposals was also rare. Furthermore, in many companies the only forum for the presentation of PCA results was a meeting of the executive group or board of directors. In such forums, reporting does not necessarily focus on learning-related issues, but on performance measurement.

The findings provided support for the validity of the synthesized PCA design. Nevertheless, some of the presented criteria are clearly more critical than others in enhancing OL. OM-related issues in particular were perceived to be of great importance in all 14 companies, whereas standard report format for PCA or communication of formal PCA results to board of directors, for example, were not perceived as critical.

Consistent with Newman's (1985) suggestion, companies may have internal policies to prevent managerial access to (sensitive) information. More importantly, it seems that reliance on alternate methods such as the utilization of central expertise and experienced

internal resources can diminish the willingness within smaller companies with lower capital investment to develop communication aspects into their PCA systems. Hence, managers may perceive that their companies achieve sufficiently satisfactory OL by complementing their PCA systems with alternate methods. Although it seems that more sophisticated PCA designs could provide a better platform for OL, managers do not necessarily perceive that they are jeopardizing the sharing and transferring of investment knowledge because of the various means available. These findings provide support for the management control package researchers (e.g. Abernethy and Chua, 1996; Otley, 1999), who maintain that, it is appropriate to adopt a broad and holistic perspective in studying management controls and not to investigate them (i.e. PCA system design) in isolation of their wider context. A broad perspective encourages the investigation of interrelationships between various available controls and allows them to be explained.

5. Concluding remarks

This cross-sectional field study investigated whether or not the designs of post-completion auditing (PCA) systems of capital investments provided a platform for organizational learning (OL). This study focused upon OL as a PCA objective because previous researchers (e.g. Neale, 1989) have suggested that it is the major reason for conducting PCA. By drawing upon Huber's (1991) OL constructs and prior PCA studies, an OL-conducive PCA design was synthesized and utilized as a benchmark for examining empirical findings.

The empirical data for this research was gathered in the 30 largest Finnish manufacturing corporations, primarily with 49 face-to-face interviews comprising two parts: a semi-structured interview and a structured questionnaire (completed in the presence of the researcher). The focus of this paper was on the 14 PCA adopting companies in which the enhancing of OL was seen as the major objective for PCA. This study adds to the extant

PCA literature by being the first explicit attempt to investigate the relationship between PCA design and OL using empirical evidence from interviews. It can be regarded predominantly as an explorative investigation, paving the way for further studies. In addition to serving an academic audience interested in the relationship between PCA and OL, this paper may provide useful tools for practitioners who seek to design their PCA systems more effectively.

This study contributes to the PCA literature by extending the discussion on the relationship between PCA design and OL to cover information interpretation and distribution and aspects of organizational memory. Specifically, this study responded to Haka's (2007, p. 723-4) recent call to examine why PCAs seem to be ineffective in helping firms with their capital investment planning and decision making. The empirical results allow for the suggestion that ineffectiveness can be related to PCA design. In particular, it appears that organizational-memory-related issues such as inappropriate filing and difficult access to PCA reports hinder effective conveying of investment experiences to new projects. Other aspects related to the communication of PCA reports may hinder OL: lack of improvement proposals and their systematic follow-up, lack of interactive forums for interpretation of results, and restricted dissemination. Additionally, the findings provide support for the contention that sophisticated PCA designs help companies to transfer and share learning experiences more effectively.

This study makes an additional contribution to the PCA literature by providing discussion about the reasons behind the variations in PCA design sophistication. In line with the management control system literature (e.g. Chenhall, 2003), it appears that the small size of a company constitutes a likely reason for less sophisticated PCA systems Other means of managing capital investment knowledge (e.g. utilizing central expertise and experienced internal resources) also seem to affect the degree of sophistication. Thus it may

be perceived in smaller companies that a sufficient OL outcome can be achieved by relying on the combination of less sophisticated PCA systems and alternate means.

Further analyses are required to deepen our knowledge about PCA designs and OL. It would be fruitful, for instance, to study how PCA systems have evolved in companies over time (cf. Hansen and van der Stede, 2004, in budgeting context). The roles of human factors like key decision-making individuals or teams in designing PCA systems need further investigation (cf. Miller, 1987). The relationship between the PCA configuration and perceived OL benefits also requires more examination. Specifically, it is essential to shed more light on aspects of the organizational memory of PCA in transferring and sharing capital investment knowledge. It appeared in this study that alternate methods of managing capital investment knowledge discouraged the development of PCA systems. By drawing on notions in the management control package literature (e.g. Otley, 1999), further examination could address the complementarity issues of formal PCA and alternate control mechanisms (Fisher, 1995).

Acknowledgements

I wish, in particular, to thank Seppo Ikäheimo and Teemu Malmi for their constructive comments on this paper. The paper has also benefitted from comments and discussions with Robert Chenhall, Katja Kolehmainen, Taru Lehtonen, Vesa Partanen, Mikko Sandelin, Wim van der Stede, Risto Tainio, and Juhani Vaivio. I am also grateful to the participants of the 6th Conference on New Directions in Management Accounting Research (EIASM) in Brussels (2008). Financial support for this study by the HSE Foundation and GSA is acknowledged with gratitude.

References

Abernethy, M.A., Chua, W.F., 1996. A field study of control system "redesign": the impact of institutional processes on strategic choice. Contemporary Accounting Research 13(2), 569-606.

Ackerman, M., 1994. Definitional and Contextual Issues in Organizational and Group Memories, Proceedings of 27th Hawaii International Conference on Systems Sciences (HICSS-27), Hawaii, January, 1994.

Al-Omiri, M., Drury, C., 2007. A survey of factors influencing the choice of product costing systems in UK organizations, Management Accounting Research 18(4), 399-424.

Argyris, C., 1990. The dilemma of implementing controls: the case of managerial accounting. Accounting, Organizations and Society 15(6), 503-511.

Arnold, G.C., Hatzopoulos, P.D., 2000. The theory-practice gap in capital budgeting: evidence from the United Kingdom. Journal of Business Finance & Accounting 27(5/6), 603-626.

Azzone, G., Maccarrone, P., 2001. The design of the investment post-audit process in large organisations: evidence from a survey. European Journal of Innovation Management 4(2), 73-87.

Carmona, S., Grönlund, A., 1998 Learning from forgetting; an experiential study of two European car manufacturers. Management Learning 29(1), 21-38.

Chenhall, R.H., 2003. Management control systems design within its organizational context: findings from contingency-based research and directions for the future. Accounting, Organizations and Society 28(2/3), 127-168.

Chenhall, R.H., 2005. Integrative strategic performance measurement systems, strategic alignment of manufacturing, learning and strategic outcomes: an exploratory study. Accounting, Organizations and Society 30(5), 395-422.

Chenhall, R.H., Morris, D., 1993. The role of post completion audits, managerial learning, environmental uncertainty and performance. Behavioral Research in Accounting 5, 171-186.

CIMA, 2005. Management Accounting Official Terminology. CIMA, London.

Corr, A.V., 1983. The Capital Expenditure Decision. National Association of Accountants and the Society of Management Accountants of Canada, Hamilton, Canada.

Croasdell, D.T., 2001. IT's role in organizational memory and learning. Information Systems Management, Winter, 8- 11.

Daft, R.L., Sormunen, J., Parks, D., 1988. Chief executive scanning, environmental characteristics, and company performance: an empirical study. Strategic Management Journal 9, 123-139.

Daft, R.L., Weick, K.E., 1984 Toward a Model of Organizations as Interpretation Systems. Academy of Management Review 9(2), 284-295.

Dillon, R., Caldwell, J.C., 1981. A System for Postauditing Capital Projects. Managerial Planning, Jan/Feb, 18-30.

Farragher, E.J., Kleiman, R.T., Sahu, A.P., 1999. Current capital investment practices. The Engineering Economist 44(2), 137-150.

Fisher, J., 1995. Contingency-based research on management control systems: categorization by level of complexity. Journal of Accounting Literature 14, 24-53.

Gadella, J.W., 1986. Post auditing the capital-investment decision. Management Accounting (UK), November, 36-37.

Garvin, D., 1993. Building a Learning Organization, Harvard Business Review 71(4), 78-91.

Ghobadian, A., Smyth, D.A., 1989. The role of the post-audit procedure in effective control of capital projects, In: Macbeth, D. K., Southern G. (Eds.), Proceedings of the Operations Management Association UK Annual International Conference, 5-6 January Dunblane, Scotland. IFS Publications/Springer-Verlag Bedford, UK.

Ghoshal, S., Bartlett, C.A., 1988. Creation, adoption, and diffusion of innovations by subsidiaries of multinational corporations. Journal of International Business Studies 19, 365-388.

Ghoshal, S., Korine, H., Szulanski, G., 1994. Interunit communication in multinational corporations. Management Science, 40(1), 96-110.

Gordon, L.A., Myers, M.D. 1991 Postauditing capital projects; are you in step with the competition? Management Accounting (USA), January, 39-42.

Granlund, M., 2001. Towards explaining stability in and around management accounting systems. Management Accounting Research, 12(2), 141-166.

Gulliver, F.R., 1987. Post-project appraisals pay, Harvard Business Review, 65(2), March – April, 128-132.

Haka, S.F., 2007. A Review of the Literature on Capital Budgeting and Investment Appraisal: Past, Present, and Future Musings. In: Chapman, C., Hopwood, A., Shields, M. (Eds.), Handbook of Management Accounting Research - Volume 2. Elsevier, Oxford.

Hansen, S.C., Van der Stede, W.A., 2004. Multiple facets of budgeting: an exploratory analysis. Management Accounting Research 15(4), 415-439.

Huber, G.P., 1991. Organizational learning: the contributing processes and the literatures. Organization Science 2(1), 88-115.

Huikku, J., 2007. Explaining the Non-Adoption of Post-Completion Auditing. European Accounting Review 16(2), 363-398.
Huikku, J., 2008. Managerial uses of post-completion auditing of capital investments. The Finnish Journal of Business Economics 57(2), 139-164.
Jensen, R.J., Szulanski, G., 2007. Template use and the effectiveness of knowledge transfer. Management Science 53(11), 1716-1730.
Jönsson, N., 1996. Accounting for improvement. Pergamon, Oxford.
Jönsson, N., 1998. Relate management accounting research to managerial work! Accounting, Organizations and Society 23(4), 411-434.
Kennedy, J.A., Mills, R.W., 1993. Post-completion auditing in practice. Management Accounting (UK), October, 22-25.
Klammer, T.P., Walker, M.C., 1984. The Continuing Increase in the Use of Sophisticated Capital Budgeting Techniques. California Management Review XXVII(1), Fall, 137-148.
Kloot, L., 1997. Organizational learning and management control systems: responding to environmental change. Management Accounting Research 8(1), 47-73.
Kolb, D.A., 1984. Experiential Learning. Prentice Hall, Englewood Cliffs, NJ.
Levitt, B., March, J.G., 1988. Organizational learning. Annual Review of Sociology 14, 319-340.
Lillis, A.M., Mundy, J., 2005. Cross-sectional field studies in management accounting research – closing the gaps between surveys and case studies. Journal of Management Accounting Research 17, 119-141.
Malmi, T., Brown, D.A., 2008. Management control systems as a package – Opportunities, challenges and research directions. Management Accounting Research 19(4), 287-300.
Marquardt, M., Reynolds, A., 1994. The Global Learning Organization. Irwin, Burr Ridge, Illinois.
Merchant, K.A., 1981. The design of the corporate budgeting system: influences on managerial behavior and performance. The Accounting Review 56(4), 813-829.
Miller, D., 1987. The genesis of configuration. Academy of Management Review 12(1), 686-701.
Mills, R.W., Kennedy, J.A., 1990. Post-Completion Audit of Capital Expenditure Projects, Management Guide No. 9. CIMA, London.
Mills, R.W., Kennedy, J.A., 1993. Experiences in operating a post-audit system. Management Accounting (UK), November, 26-28.
Mukherjee, T.K., 1987. Capital budgeting surveys: the past and the future. Review of Business & Economic Research 22(2), 37-56.
Mukherjee, T.K., 1988. The capital budgeting process of large U.S. firms; an analysis of capital budgeting manuals. Managerial Finance 14(2/3), 28-35.
Neale, C.W., 1989. Post auditing practices by UK firms: aims, benefits and shortcomings. British Accounting Review 21(4), 309-328.
Neale, C.W., 1991a. The benefits derived from post-auditing investment projects. OMEGA International Journal of Management Science 19(2/3), 113-120.
Neale, C.W., 1991b. A revolution in post-completion audit adoption. Management Accounting (UK), November, 44-46.
Neale, C.W., 1994. Investment post-auditing practices among British and Norwegian companies: a comparative study. International Business Review 3(1), 31-46.
Neale, C.W., Holmes, D.E.A., 1990. Post-auditing capital projects. Long Range Planning 23(4), 88-96.
Neale, C.W., Holmes, D.E.A., 1991. Post-Completion Auditing. Pitman: London.
Newman, M., 1985. Managerial access to information: strategies for prevention and promotion. Journal of Management Studies 22(2), 193-211.
Nonaka, I., Takeuchi, H., 1995. The Knowledge Creating Firm: How Japanese Companies Create Dynamics of Innovation. Oxford University Press, New York.
Northcott, D., Alkaraan, F., 2007. Strategic investment appraisal. In: Hopper, T., Northcott, D., Scapens, R. (Eds.), Issues in Management Accounting, 3rd ed. Prentice Hall, Harlow.
Otley, D., 1999. Performance management: a framework for management control systems research. Management Accounting Research 10(4), 363-382.
Pierce, B.J., Tsay, J.J., 1992. A study of the post-completion audit practices of large American corporations: experience from 1978 and 1988. Journal of Management Accounting Research 4, Fall, 131-155.
Polanyi, M., 1966. The Tacit Dimension. Routledge & Kegan Paul, London.
Salterio, S., Denham, R., 1997. Accounting Consultation Units: An Organizational Memory Analysis. Contemporary Accounting Research 14(4), 669-691.
Scapens, R.W., Roberts, J., 1993. Accounting and control: a case study of resistance to accounting change. Management Accounting Research 4(1), 1-32.
Scapens, R.W., Sale, J.T., Tikkas, P.A., 1982. Financial Control of Divisional Capital Investment. CIMA, London.
Senge, P., 1990. The Fifth Discipline. Currency Doubleday, New York.

Simons, R., 1990. The role of management control systems in creating competitive advantage: New perspectives. Accounting, Organizations and Society 15(1/2), 127-143.
Simons, R., 1995. Levers of Control. Harvard Business School Press, Boston.
Smyth, D., 1990. How to structure an effective PCA. Accountancy, September, 90,93.
Teece, D., Pisano, G., Shuen, A., 1997. Dynamic capabilities and strategic management. Strategic Management Journal 18(7), 509-533.
Tucker, M.L., Meyer, G.D., Westerman, J.W., 1996. Organizational Communication: Development of Internal Strategic Competitive Advantage. The Journal of Business Communication 33(1), 51-69.
Walsh, J.P., Ungson, G.R., 1991. Organizational memory. Academy of Management Review 16(1), 57-91.
Waterhouse, J.H., Tiessen, P. 1978. A contingency framework for management accounting systems research. Accounting, Organizations and Society 3(1), 65-76.
Zander, U., Kogut, B., 1995. Knowledge and the Speed of the Transfer and Imitation of Organizational Capabilities: An Empirical Test. Organization Science 6(1), 76-92.

Appendix A: A theme interview structure

General

- Description of the person to be interviewed (education, career, main tasks and current responsibilities)
- How is the person to be interviewed participating in the capital investment process?
    - What kinds of investment proposals and decisions do you make?
    - How often do you propose or reject investments?
- Do you have a written investment policy & instructions (please, copy if possible)?
    - Who is responsible for instructions?
- What kinds of investments do you make?

Capital investment process

- Describe your investment process.
- What kinds of investment calculations are prepared?
- Who makes the calculations?
- Are bonuses somehow related to the success of capital investments?
- How are internal auditors involved in your capital investment process?
- How realistic are investment proposals in your corporation?

Monitoring (= control of costs and timetable of investment before the start-up)

- How do you follow cost accumulation and timetable per project?
    - Who does it, when, tools used, forums for presentation of follow-up, dissemination of results, final report?
- Are there cost overruns?
    - What happens if costs are exceeded?

Post-audit of capital investments (= control or evaluation of the investment after start-up)

- This issue will be covered mainly by an interview with *a separate set of questions*.
- Please give an example of your post-audit report
- How do you control otherwise your investments (methods other than formal monitoring and post-audit)?
- How do people motivate their statements about the success of the investment project if post-audits are not conducted?
- Do you feel that post-audit reports are sometimes manipulated?

Organizational learning and capital investments

- Question 44 in a separate set of questions. Please describe more in detail your practices to utilize existing knowledge related to capital investing.
- What kinds of issues can be learnt in the capital investment process? (Please consider all the phases in the investment process):
    - Examples of learning experiences?
    - How have learning experiences been utilized or could be utilized in your coming projects?
    - How have learning experiences affected your investment process?
    - Examples of potential learning cases in your business?
- What is the role of central investment expertise (e.g. engineering unit, investment unit, investment council, technical director etc.) in your capital investments?
- How do you ensure that you learn from your investment projects?
- Are you satisfied with the learning processes related to your capital investment activities?

Appendix B: PCA design properties in the companies studied (n = 14)

	A	M	D	B	C	E	I	G	H	J	K	L	F	N	Yes	No
KNOWLEDGE ACQUISITION																
1. Repetitive, pilot and complex investments selected to PCA	X	X	X	X	X	X	X	X	X	X	X	X	X	X	14	0
2. PCA conducted after, but not long after, an investment is stabilized	X	X	X	X	X	X	X	X	X	X	X	X	X	X	14	0
3. Both investing unit and outside staff involved in making a PCA report	X	X	X	X	X	X	X	X	X	X	X	X	X	X	14	0
4. Division or corporate HQ responsible for PCA activities	X	X	X	X	X	X	X	X	X	X	X	X	X	X	14	0
INFORMATION DISTRIBUTION & INTERPRETATION																
5. The same capital budgeting calculation methods used ex ante & ex post	X	X	X	X	X	X	X	X	X	X	X	X	X	X	14	0
6. Detailed comparisons of ex-ante and ex-post calculations in PCA reports	X	X	X	X	X	X	X	X	X	X		X			11	3
7. Comments on the achievement of objectives included in PCA reports	X	X	X	X	X		X		X	X	X	X	X	X	12	2
8. Common language used in PCA reports (at least in summaries)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	14	0
9. Standard report format for PCA report	X	X				X			X					X	5	9
10. PCA report includes always or often proposals for future investments	X	X	X	X						X		X			6	8
11. Formal proposals follow-up takes place	X		X		X										3	11
12. Interactive primary forum for presentation of PCA reports exists	X	X	X	X	X							X			6	8
13. Presentation of PCA reports to executive group	X	X	X	X		X	X	X	X	X	X		X		11	3
14. Presentation of PCA reports to board of directors			X			X	X	X			X				5	9
15. Final PCA reports disseminated to all people involved in the project			X		X	X	X	X			X				6	8
ORGANIZATIONAL MEMORY																
16. Widely known archives or databases of PCA reports exist	X	X													2	12
17. Relevant people have convenient access to PCA reports	X	X													2	12
Sum of Yes per company	15	14	14	11	11	11	11	10	10	10	10	10	8	8		

Appendix C (1/2): PCA designs in the companies studied

	A	B	C	D	E	F	G
KNOWLEDGE ACQUISITION:							
Selection criteria for PCA projects	Size	Size or unfavourable development	Size or strategic	Size or unfavourable development	Size	Size and expansion (simultaneously)	Size and expansion (simultaneously)
Timing of PCA (first round after completion)	About 12 months	About 12 months	6 to 12 months	Almost on monthly basis	About 12 months	About 12 months	6 to 12 months
PCA auditor	SVP, investments (Division head office)	Investing unit itself	Investing unit itself	Investing unit itself	Investing unit itself	Investing unit itself	Headquarters' controller
Responsibility for PCA	Division	Corporation (minor investments: divisions)	Division	Corporation	Corporation	Division	Corporation
INFORMATION DISTRIBUTION AND INTERPRETATION:							
Content of a PCA report:							
- Detailed comparisons of ex-ante and ex-post calculations	Yes	Yes	Yes	Yes	Yes	No	Yes
- Comments on the achievement of objectives	Yes	Yes	Yes	Yes	No	Yes	No
- Common corporate language used	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- Standard Report format	Yes	No	No	No	Yes	No	No
- Proposals for future projects	Always	Often	Seldom	Often	Never	Seldom	Never
- Formal proposal follow-up	SVP, Investments	No formal follow-up	Development meeting and director	Business Unit technology director	No proposals	No formal follow-up	No proposals
Presentation forum for PCA reports:							
- Primary	Investment prioritization team	Corporate Investment Committee	Corporate Development meeting	Corporate Technology & Operations meeting	Corporate BOM	Division BOM	Corporate BOM
- Secondary	(Corporate BOM if something odd)	Divisional BOM	Corporate Technical & Operations group	Division BOM	Corporate BOD	Corporate BOM	Corporate BOD
- Presentation to executive group	Yes (if something odd)	Yes	No, only distribution	Yes	Yes	Yes	Yes
- Presentation to board of directors	No	No	No, only distribution	Yes	Yes	No	Yes
Dissemination of final PCA reports to all people involved in the project	No	No	Yes	Yes	Yes	No	Yes
ORGANIZATIONAL MEMORY:							
Archiving and filing of PCA reports:							
- Widely known archives or databases of PCA reports exist	Yes	No	No	No	No	No	No
- Convenient access to PCA reports	Yes (via intranet)	No	No	No	No (however, partly via intranet)	No	No
- Reports available from	SVP, investments	Corporate Investment Office	Development Meeting protocol	SVP, Operations & Sourcing	Corporation Investment Staff	Country organization, Financial staff	Management Accounting Controller

Appendix C (2/2): PCA designs in the companies studied

	H	I	J	K	L	M	N
KNOWLEDGE ACQUISITION:							
Selection criteria for PCA projects	Size	Size or strategic	Size or strategic	Size	Size	Size	Size and expansion (simultaneously)
Timing of PCA (first round after completion)	Between 24 and 36 months	Between 12 and 24 months	Between 24 and 36 months	About 12 months	Between 12 and 48 months	Between 24 and 36 months	About 12 months
PCA auditor	Investing unit itself	Divisional investment or engineering staff	SVP, investments	Investing unit itself	Controllers of other unit	Headquarters' controller	Jointly (investing & HQ engineering unit)
Responsibility for PCA	Corporation	Corporation	Corporation	Division	Corporation	Division	Corporation
INFORMATION DISTRIBUTION AND INTERPRETATION:							
Content of a PCA report:							
- Detailed comparisons of ex-ante and ex- post calculations	Yes	Yes	Yes	No	Yes	Yes	No
- Comments on the achievement of objectives	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- Common corporate language used	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- Standard Report format	Yes	No	No	No	No	Yes	Yes
- Proposals for future projects	Seldom	Seldom	Often	Seldom	Always	Often	Seldom
- Formal proposal follow-up	No formal follow-up	No formal follow-up	No formal follow-up	No formal follow-up	No formal follow	No formal follow-up	No formal follow-up
Presentation forum for PCA reports:							
- Primary	Corporate BOM	Divisional BOM	Corporate BOM	Plant BOM	Group controllers' meeting	Investment team	No forum
- Secondary	---	Corporate BOM	Divisional BOM	Divisional BOD	---	Divisional BOM	---
- Presentation to executive group	Yes	Yes	Yes	Yes	No	Yes	No
- Presentation to board of directors	No	Yes	No	Yes	No	No	No
Dissemination of final PCA reports to all people involved in the project	No	Yes	No	Yes	No	No	No
ORGANIZATIONAL MEMORY:							
Archiving and filing of PCA reports:							
- Widely known archives or databases of PCA reports exist	No	No	No	No	No	Yes	No
- Convenient access to PCA reports	No	No	No	No	No	Yes (in LAN)	No
- Reports available from	Operations controller at HQ	Investment service	CFO; VP, inv.; SVP, inv.	Plant development manager	Operations controller at HQ	LAN, (controller at HQ)	Report makers, engineering group