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THEORY AND PRACTICE OF THE POST-AUDIT OF CAPITAL PROJECTS: EVIDENCE FROM THE CZECH REPUBLIC

Abstract:

This paper reports on the post-audit practices of organisations in the Czech Republic. Much of the earlier published empirical research has been conducted in Australia, Canada, the USA, and Western Europe. Only recently, attention has been given to emerging markets, including Eastern European accession/transition countries. This exploratory study's main objective is to identify CZ companies' post-audit practices and obtain opinions on various post-audit issues. It also seeks to assess if these practices mirror those adopted by more developed economies. The research adopts interview, questionnaire, and descriptive statistical analysis approaches. Project management is an integral aspect of logistics. Although at the fringe of the general understanding of logistics (the management of the flow of goods), it is a vital aspect. The authors believe that this is one of the first papers to focus on CZ post-audit practices and fills an important gap in the applied logistics literature.

Key Words: Capital budgeting, Czech Republic, Investment appraisal, Logistic infrastructure, Post-audit, Post completion audit, Project management.

1. INTRODUCTION

The investment process is one of the most important operations conducted by managers. It contains a series of steps, with the original project proposal, investment appraisal, selection (investment decision), implementation, completion, and finally, the post-audit (Lefley, 2016). Baig et al., (2020) state that there are four stages before the project selection: idea generation, strategic planning, analysis, and risk evaluation, with the end critical post-audit stage. This last, post-audit stage is often ignored by organisations and is also less discussed in the literature (Lefley, 2019; Morgan & Tang, 1993). Soares et al., (2007, p 22) argue that the empirical literature on the subject of post-audits, “within the corporate context is scarce” and that one of the reasons for this scarcity certainly has to do with the confidentiality imposed by private firms on their own evaluations”. Earlier research tends to focus on the prior post-audit stage, i.e., the ‘investment decision’ stage (Burns & Walker, 2009; Emmanuel et al., 2010; Lefley, 2004), with the project management literature, focusing, to some extent, on the ‘implementation’ stage (Joslin & Müller, 2015).

This exploratory study's main objective is to identify CZ companies' post-audit practices and obtain opinions on various post-audit issues. It also seeks to assess if these practices mirror those adopted by more developed economies.

Post-audits are a formal procedure (based on written guidelines) aimed at comparing the benefits derived from a project with the pre-investment appraisal estimates and are conducted after the completion stage of the project (Lefley, 2016). Post-audits relate to a post-implementation review of achieved benefits (Farbey et al., 1999). The literature (Schindler & Eppler, 2003), on the post-audit framework, suggests that an audit team is required to answer five essential questions:

- What was supposed to happen?
- What actually happened?
- Why were there differences?
- What can you learn from this experience?
- What should be done differently in the future, and by whom?

A post-audit framework should include at least three elements (Lefley, 2016):

- Objectives: Control, learning, and evaluation.
- Core variables: Establishing a post-audit team, project selection, post-audit timing, number of audits, documentation, information (to be evaluated), organisational culture (level of management support, how and to whom results should be communicated, etc.).
- Action: Diffusion of post-audit findings, learning from both positive and negative outcomes, and management decision-making improvement.

“Post-audit is an all-important phase of system life cycle, yet it is the most omitted or haphazardly done” (Udo, 1993, p. 27). “Post-completion auditing is a system of control which is both part of the capital budgeting system and also a regulator of it” (Neale, 1995, p. 17).

Much of the earlier published empirical research has been conducted in Australia, Canada, the USA, and Western Europe (de Andrés et al., 2015; Lefley, 2013). Only recently, attention has been given to emerging markets (Maquieira et al., 2012; de Souza & Lunkes, 2016), including Eastern EU accession/transition countries (Andor et al., 2015; Nivorozhkin, 2005). Our research focuses on the Czech Republic – an Eastern European transition country. Like many Central and Eastern European countries, the Czech Republic is an open economy, “where most of the GDP is produced by small - and medium-sized companies” (Andor et al., 2015, p. 149). The importance of focusing on this country is to see if the managerial practices concerning the post-audit of capital projects mirror those adopted by more developed economies. Can the developed economies learn from the less developed? The relatively few empirical studies that have been undertaken in Central and Eastern European countries, concerning capital budgeting practices, make little reference to the important post-audit stage and seem to focus on investment appraisal models (Andor et al., 2015).

The research adopts interview, questionnaire, and descriptive statistical analysis approaches. The opinions of those who conduct post-audits and those who do not are also analysed. Contrary to Western Europe's research findings, *control* is seen as the most important objective of undertaking a post-audit. Our results suggest that it is just as important to identify *success* (and reward the manager) as *failure* (and blame the manager). Project management is an integral aspect of logistics, especially for transportation infrastructure projects. Although at the fringe of the general understanding of logistics (the management of the flow of goods) it is an important aspect. Post-audit of capital projects is an important, although in many cases neglected, stage in the project management process. This paper fills an important gap in the applied logistics literature.

The paper goes on to review some of the important literature concerning the post-audit of capital projects. In Section 3, we look at the research structure and methodology. Section 4, presents the research findings, followed in Section 5 by the discussion and analysis, and finally in Section 6 with the conclusions.

2. LITERATURE REVIEW

From our introduction, and supporting the literature (Lefley, 2016), we postulate that post-audits are a formal procedure aimed at comparing the benefits derived from a project and the pre-investment appraisal estimates. Future capital investment decisions can benefit from previous post-audits which provide valuable feedback from an earlier project (Huikku & Lukka, 2016; Huikku, 2007; Pierce & Tsay, 1992; Neale & Holmes, 1990; Smith, 1994). Udo (1993, p. 26) states that “successful MIS projects often have sound post-audit programs to identify possible problems and correct them at the early stage of the newly installed or modified system.” The literature (Myers et al., 1991) shows a positive link between implementing well-defined post-audit procedures and enhanced firm performance. Sandström

et al., (2016, p. 135) state “The aims of post-auditing are, among others, to enable better decision making (in future investments), to ensure improvement in planning, and to encourage more realistic project assessments.” They also claim, “that the benefits of understanding the whole life cycle of each project and being able to compare planning with the actual results are quite obvious” (Sandström et al., 2016, p. 135).

Learning:

Earlier theoretical observations point out that organisational learning is perhaps one of the most critical objectives pursued in a post-audit system (Azzone & Maccarrone, 2001; Huikku, 2011; Huikku & Lukka, 2016; Lefley, 2016; Prueitt & Park, 1991; Walker 2009). The theoretical underpinning of post-audits may, to some extent, rest in the organisational learning theory paradigm, rather than the auditing theory paradigm (Lefley, 2016). In Pinches (1982) opinion, one of the objectives of a post-audit is improving future capital expenditure by learning from past mistakes. According to Primrose (1996), post-audits may be seen as a learning exercise to produce more accurate appraisals in the future and thus have value. Continuous improvement is an important feature of organisational learning (Wang & Ahmed, 2003). The foremost perceived benefits from post-audits are related explicitly to enriching organisational learning, leading to future improvements in capital investments (Neale 1991, 1995; Pierce & Tsay 1992). However, “One of the most important shortcomings of a post-audit from the point of view of organisational learning is that a post-audit often offers no benefit to ex ‘users’ of a certain project” (Sandström et al., 2016, p. 139). Ma’aji & Barnett (2019, p. 173) argue that post-auditing “involves comparison of actual results with the planned ones” ... “unfavourable results are identified and analysed; resolving the various difficulties of the project helps for future selection” – a learning opportunity.

Control:

Feedback on a capital project's investment performance is seen as an important objective of a post-audit, suggesting a ‘control’ aspect (Lefley, 2016). Supporting this view, Morgan & Tang (1993, p. 477), state that post-audits “can be used as a control mechanism helping to ensure that investment performance is in accordance with original expectations”. Azzone & Maccarrone (2001, p. 73) state: “The post-audit (PA) of investments is the control process aimed at making an overall revision of all those activities concerning the management of an investment proposal, from its definition, to its implementation, up to the end of its life”. Sandström et al., (2016, p. 138) argue that one of the reasons for undertaking a post-audit is to “control the life cycle of an investment”. “Post audit and controlling are effective risk management tools in the final stages of the project” (Janekova et al., 2019, p. 242).

Management evaluation:

The literature (Huikku 2008, 2011; Lefley, 2016; Pierce & Tsay, 1992) argues that one of the benefits of post-audits is that they can evaluate management performance in relation to the project. There is, however, a point expressed in the literature concerning this particular objective. Post-audits may make managers more accountable, but they could create conflict where the blame for failure is sought (Primrose, 1996). There are “conceptual problems in using the same control system to improve organisational learning and to judge people” (Azzone & Maccarrone, 2001, p. 79). Udo (1993, p. 30) argues that post-audits should not be used “to reward or punishment the project team”. This view is supported by Riggs et al., (1998, p. 460), who argue that “the purpose of auditing investments is not to punish those who approve the proposals” ... “The aim is to improve future analysis.” Azzone & Maccarrone (2001). argue that:

“It is better to limit the use of post-audits for behaviour control purposes to the implicit motivational impact of the post-audit system” ... “managers can see it as a really useful tool for a better management of investment proposals, and they could be willing to collaborate to the revision process, giving the benefits, they could perceive from a good analysis” (p. 75).

Singhvi (1986) argues that post-audits should not be used to find scapegoats to blame for unsuccessful projects. Lefley (2016, p. 1146) believes that “post-audits may, to some extent, be justifiable as part of a much wider management evaluation process but on their own, they lack the diversity and rigour of an effective management control system”. However, the literature suggests that few organisations use post-audits as a formal assessment of management performance and reward (Huikku, 2008; Huikku & Lukka, 2016).

Biased forecasts:

According to the literature, a post-audit will identify biased forecasts that may arise from economic, political, psychological, and technical influences (Cantarelli et al., 2010; Flyvbjerg et al., 2002; Turner & Guilding, 2012). A ‘project champion’ is also in a position to bias cashflow projections (Cross & Brodt, 2001; Lefley, 2008). It is argued that when managers know that a project will be subject to a post-audit, they are less likely to inflate cashflow forecasts (Lumijärvi, 1991; Smith, 1994).

Project modification, abandonment, etc:

As an aid to project modifications and abandonment decisions, post-audits' benefits may be limited (Huikku, 2007). “The reason for post-auditing is to gain new information about the success or failures of the capital budgeting process” (Sandström et al., 2016, p. 138). A post-audit may reveal a strategic opportunity (Neale, 1995). In some cases, however, a post-audit's primary objective was seen as just a way of bringing closure to the project (Kumar, 1990). In support of Kumar's comment, post-audits' objectives are not always clear and may not be the review of actual benefits achieved but merely a mechanism for bringing a formal closure to the project (Ward et al., 1996). In some cases, a post-audit may be mandatory; for example, as part of a loan/financial arrangement, etc. It is this last aspect that has received little, if any, attention in the literature.

3. RESEARCH STRUCTURE AND METHODOLOGY

Our current research is part of a much larger, ongoing, study into the capital budgeting practices of Czech Republic organisations. This paper focuses on the final stage of the project management process – the post-audit stage.

Research path:

In the first stage of our research, 62 large Czech Republic companies completed a general questionnaire on the appraisal of capital projects, with the emphasis being on ICT projects, giving a response rate of almost 49%. These 62 companies were later approached to see if they would participate in the second stage of our research – the post-audit of capital projects. Interviews were conducted with three responding companies to help us focus and design a second questionnaire, on the various attributes/issues of post-audits with respect to Czech Republic companies. The second questionnaire was then sent to all 62 companies, of which valid responses were received from 21 companies giving a response rate of 33.9%. Of these 21 companies, 13 (61.9%) stated that they did conduct post-audits for some, if not all, capital projects, while, 8 (38.1%) indicated that they did not conduct any post-audits (Table 1). These

results are not too dissimilar to a recent Western European survey, which showed that 67.6% of companies conducted a post-audit, while 32.4% did not (Lefley, 2016).

Research instrument:

The second questionnaire consists of three parts. The first part of the questionnaire is of a generic nature. Respondents were asked about identification (position in the company, length of employment, the company's industrial branch and size, etc.). In this part, we also ask about post-audits' performance and the importance of the theoretical reasons for conducting post-audits. The second part was for companies that conduct post-audits. We ask about reasons for undertaking or not undertaking post-audits, difficulties with conducting a post-audit, benefits, etc. The last part of the questionnaire was directed at respondents, who do not conduct post-audits, and we ask about the reasons for not undertaking.

Research objectives/questions:

This exploratory study's primary goal was to identify CZ companies' post-audit practices and obtain opinions on various post-audit issues. It also seeks to assess if these practices mirror those adopted by more developed economies. Our research focuses on eight key research questions:

- Q1. What is the level of adoption of post-audits?
- Q2. What are the important objectives of a post-audit?
- Q3. What are the reasons for undertaking a post-audit?
- Q4. What are the reasons for not undertaking a post-audit on all projects?
- Q5. How are projects selected for a post-audit?
- Q6. What are the problems faced in implementing post-audits?
- Q7. What prior investment decision knowledge should, or could have, been know?
- Q8. What are the reasons for not undertaking any post-audits?

From these questions, we formulate our research statements on which we seek opinions from our respondents.

Statistical Analysis:

We use six-point Likert-type items/statements, to obtain the respondents' opinions on various aspects appertaining to post-audits. The 'numbers' assigned to Likert-type items express a 'greater than' relationship, but how much greater is not implied. As such, Likert-type items fall into the ordinal measurement scale, with the appropriate descriptive statistics being mode or median for central tendency and frequencies for variability (Boone & Boone, 2012).

However, it is not uncommon for researchers to analyse data from Likert-type items using the mean and standard deviation (see, for example, Huikku 2008). Clason & Dormody (1994) identified 51 papers published in one particular research journal, over a period of five years, where the mean and standard deviation had been used to analyse individual (not summated) Likert-type items (questions). They also state (p. 31) from their findings "that a variety of statistical methods are being used to analyse data from individual Likert-type items". For this reason, and to facilitate comparison with other research papers, we have also included the mean and standard deviation in our analysis.

4. RESEARCH FINDINGS

Adoption of post-audits [Q1]:

As far as the companies who do conduct post-audits are concerned, Table 2 describes the total number of projects implemented by these companies and the number of projects subjected to a post-audit. Six hundred and sixty-four projects were implemented; sixty-one (9.2%) related

to ICT projects, while six hundred and three (90.8%) were non-ICT projects. It appears that post-audits are not very often undertaken, as only one hundred and ninety-one (28.8%) of all projects were subjected to a post-audit. The PA adoption rate shows to be far less than that reported in recent Western European research (Lefley 2016). It is observed that post-audits are more frequently applied to ICT projects than non-ICT projects, with 37.7% of ICT projects being subjected to a post-audit, while the figure is only 27.9% for non-ICT projects. While all participants have not answered the question regarding the decision about undertaking a post-audit, there is strong evidence to suggest that the decision is more likely to be made during the preparatory phase than during the implementation phase.

Post audit objectives [Q2]:

We now report on the objectives of undertaking post-audits from the theoretical perspective. Based on earlier literature, a post-audit has three main contributions to the company, namely; learning, control, and evaluation. Table 3 shows the importance of these objectives. The most important objective is *control* (mean 5.35, median 6.0, σ 0.91), followed by *learning* (mean 4.45, median 4.5 σ 1.117), and finally, *evaluation* (mean 4.25, median 4.0, σ 1.26). Results presented in Table 3 are for all respondents (those who conduct post-audits, and those who do not). If we analyse these two groups' results separately, we can see a higher level of importance in all objectives for those who conduct post-audits. More precisely, the mean of *control* in this group (those who carry out post-audits) is 5.462 (compared with 5.143), the mean of *learning* is 4.615 (compared with 4.143), and the mean of *evaluation* is 4.385 (compared with 4.0). Interestingly, in both groups, the most important objective is *control*, with *evaluation* being the least important objective of post-audits. This finding is contrary to recent research undertaken in Western European companies, which shows that *learning* is the most important objective (Lefley 2016).

Reasons for undertaking a post-audit [Q3]:

Table 4 highlights the different reasons for undertaking a post-audit. These results correspond with the theoretical objectives described above. The highest level of importance is shown as verification of total profitability of the project (mean 5.5, median 6.0, σ 0.645), and verification, whether the project has fulfilled the original estimation (mean 5.167, median 5.5, σ 0.799), both of which are part of a control. This was followed by identifying under-estimation of costs (mean 5.167, median 5.5, σ 0.986) as a part of learning and improving decision-making in the future (mean 5.167, median 5.0, σ 0.799) again part of learning. Other important reasons are to obtain a better understanding of the investment project (mean 4.75, median 5.0, σ 1.164) – learning, verification of sustainability of the project (mean 4.583, median 5.0, σ 1.037) - control, and identification of benefits not identified at the appraisal stage (mean 4.333, median 4.0, σ 1.247) - learning.

Factors of evaluation have an overall low level of importance. However, an interesting observation is that the importance of 'blame' and 'success' of the managers are almost identical. The mean of 'credit success and reward individuals' is 3.667 (median 3.5, σ 0.943), where the mean of 'apportion blame with respect to failed projects' is 3.417 (median 4.0, σ 1.552). We would argue that the Czech Republic's prevalent conditions suggest that it is just as essential to identify *success* (and reward the manager) as *failure* (and blame the manager). Again, this is contrary to Western European research findings, which shows that *crediting managers for success* is perceived to be of much greater importance than *apportioning blame for failure* (Lefley 2016). The lowest level of importance refers to a learning objective - identifying a need to abandon a project if required (mean 3.167, median 2.5, σ 1.724). This is surprising as identifying an opportunity to expand a project (growth option) has a relatively high level of importance (mean 3.833, median 4, σ 1.213).

Interestingly, is the factor ‘post-audit is obligatory’, where the mean is 3.333 (median 3.0, σ 1.599). This observation may be explained by the fact that half of the respondents view post-audits as being obligatory because of requirements of some other institution (ISO certification, a loan from the bank or other institution, etc.), where other respondents evaluate post-audits as an essential part of managerial work, no matter whether it is obligatory or not.

Reasons for not conducting a post-audit on all projects [Q4]:

In Table 5, we analyse the opinions of those companies who conduct post-audits, concerning the reasons why post-audits were not carried out on all projects. There are only three reasons with relatively high levels of validity namely, (i) the amount invested in the project is too small for undertaking a post-audit (mean 4.818, median 6.0, σ 1.696), (ii) the project is not so important or significant for the company for conducting the post-audit (mean 4.364, median 5.0, σ 1.226), and (iii) some projects are accepted on their strategic importance and are based on qualitative factors which are difficult to be measured after the project has been accepted (mean 4.0, median 4.0, σ 1.595). It seems that the most frequent reasons for not undertaking post-audits on some projects are linked to the importance of the project, where the project is a low cost, not important, or difficult to quantitative (measurement). On the other hand, a relatively frequently expressed factor is - no need of post-audit, because of the continual reviewing process (mean 3.818, median 3.0, σ 1.749), but this continual review is typical only for important and major projects. Additionally, just *belief* in a project's success is usually not enough, as the reason ‘no point if we believe the project is successful’ has a low mean of 3.091 (median 3.0, σ 1.311).

The reason with the lowest level of importance is ‘the post-audit is considered to be a waste of time’. That suggests that even if the company does not undertake a post-audit on all projects, primarily because of the reasons mentioned above, they usually appreciate the benefits of post-audits. Other factors with a low level of importance include (i) ‘lack of formal evaluation systems’ (mean 2.3, median 2.5, σ 1.005), (ii) ‘lack of support from those involved in project appraisals’ (mean 2.364, median 2.0, σ 1.494), and (iii) ‘during the realisation of the project has been changed technical equipment, where the evaluation of the project has become very difficult or almost impossible’ (mean 2.364, median 2.0, σ 1.226). This suggests that companies have some information tools for successfully conducting a post-audit and the expertise of individuals connected with project appraisals. They probably try not to change the conditions and technical equipment associated with the project, because they understand that these changes can make the project unsuitable for a post-audit. Answers from semi-structured interviews support these conclusions.

Criteria for project selection of a post-audit [Q5]:

It appears that companies do not usually carry out post-audits in cases where there is low invested value, it is a minor or insignificant project, or the benefits are difficult to measure. From the selection criteria, it is possible to identify four main criteria: strategic value, cost, risk, and net present value (NPV). It appeared that projects with a high cost, high strategic value, perceived high risk, and high forecasted NPV, are the ones that would most likely be subjected to a post-audit. Table 6 shows the relative importance attached to these criteria by the respondents. At the top of the agenda is ‘strategic value’ (mean 5.583, median 6.0, σ 0.493), followed by ‘project cost’ (mean 5.333, median 6.9, σ 0.943). An interesting observation is that one of these factors (strategic value) is difficult, if not impossible, to quantify, where the other one (cost) is measured in quantifiable, financial terms.

Problems faced in implementing post-audits [Q6]:

Here, we focus on the perceived issues/difficulties in carrying out post-audits, illustrating the data in Table 7. The factor with the highest mean (4.182, median 5.0, σ 1.641) is ‘post costs and benefits difficult to identify’, previously expressed opinions by the respondents support this. Another important problem is ‘sustainability of the production performance in time and its measurability’ (mean 3.818, median 4.0, σ 1.641), which is in some respects connected with the difficulty in cost and benefits calculations as a result of the changes in project performance. A third important reason is, ‘inadequacy of data at the project selection stage’ (mean 3.636, median 4.0, σ 1.772). The lowest mean (2.727, median 2.0, σ 1.601) is - the impossibility of predicting costs connected with the servicing of machines. The difficulties with post-audit performance evaluation have been highlighted by Herath (2019), especially concerning energy-saving capital projects.

Prior investment decision knowledge [Q7]:

Respondents who conduct post-audits also answered questions about the information that either should have been known before the investment decision was made (Table 8), or, on the other hand, information that was unlikely to have been known before the investment decision was made (Table 9). The respondents agree that they sometimes miss information that should have been known at the investment appraisal stage. However, the importance of this information is relatively low, where the mean of ‘violation of hygiene standards in the workplace’ is only 1.833 (median 1.0, σ 1.404), and the mean of ‘change of sell contracts during the project realisation’ is 2.417 (median 2.0, σ 1.256). It may be that the knowledge of this information at the investment appraisal stage may not have influenced the decision process. On the other hand, we would suggest that, according to the respondents, many different situations directly impact the project performance, which is unlikely to have been known before the decision was made. However, these factors can have a relatively massive influence on project performance. In some cases, they may change an initially perceived successful project into an uneconomical project, or vice versa. The most important factors are (i) market changes (mean 3.636, median 4.0, σ 1.72), (ii) problems associated with human characteristics (mean 3.636, median 4.0, σ 1.298), (iii) changes of preferences (mean 3.364, median 3.0, σ 1.226), and (iv) price increase of basic raw materials on the exchange market (mean 3.182, median 3.0, σ 1.402). On the other hand, factors with perceived lower influence are, (i) fires and other environmental disasters (mean 1.455, 1.0, σ 0.782), (ii) sudden change of political situation (mean 1.818, median 2.0, σ 0.833), (iii) discovery of a different state of the property that was originally considered (mean 2.0, median 2.0, σ 0.853), or (iv) change of the owner of the land or sale contracts on the land during the construction of the new building.

Reasons for not conducting any post-audits [Q8]:

In Table 10, we analyse the factors in Table 5 from the perspective of companies who do not perform any post-audits. This analysis reveals that the factors appear to be more important. The reasons with the greatest means are, (i) strategic importance of some projects (mean 5.125, median 5.5, σ 1.053), (ii) continual review of major projects (mean 4.375, median 4.5, σ 1.218), (iii) perceived benefits do not support the cost of undertaking post-audits (mean 4.25, median 4.5, σ 0.968), (iv) project is not so important or major for conducting a post-audit (mean 4.0, median 4.0, σ 1.0), and (v) lack of formal post-audit evaluation systems (4.0, median 4.0, σ 1.414). However, these respondents do not think that post-audits are a waste of time, as they understand the benefits. This is reflected by the low mean of 2.25 (median 2.0, σ 1.299).

Moreover, some reasons seem to be important for both groups of respondents (for example, ‘strategic importance’, or ‘not important or major project’). However, the level of importance of these factors is different. The important difference appears to be in the answer concerning the formal post-audit evaluation system. This factor is relatively important for

those who do not conduct post-audits, where it has almost the lowest mean for those who conduct post-audits. We would suggest that this can be explained by how companies in the Czech Republic need to use some formal evaluation system. If they do not have such a system, they do not conduct any post-audits, even if they understand that this process can benefit them. On the contrary, companies with some formal evaluation system do conduct post-audits, but only on important and significant projects with measurable benefits and costs. Strategically important projects are usually implemented, on their strategic value, even if the economic return on such projects look questionable.

5. DISCUSSION AND ANALYSIS

Table 11 presents verification, whether the evaluation of reasons for not carrying post-audits is statistically significant between the companies that conduct some post-audits and those that do not. From a statistical point of view, we would like to verify the null hypothesis about the different development of means of two different sets of results. T-test has been used to evaluate this null hypothesis, where the critical value on the 0.05 level of significance is 2.11.

As stated earlier in the paper, even if companies that do not conduct post-audits value these factors more (with only a few exceptions), the differences are relatively low. This observation is supported statistically, where the null hypothesis is rejected in almost all situations. This can be explained, as the means of both groups of companies are similar. However, in nearly all cases, there is a relatively high level of p-values, which means that these results cannot be generalised; it is valid only on the examined set of analysed companies. In other words, with a different group of companies, there can be different answers and therefore different means - also significant differences between the responses of those who conduct post-audits and those who do not. The only exception is the 'lack of formal post-audit evaluation systems' (marked ** in the table). This reason has a low p-value, which means that the answers can be applied generally. The null hypothesis can't be rejected at this level - the means are statistically different. It implies that not having an evaluation system seems to be a significant reason for those companies who do not conduct post-audits; they probably do not know how to evaluate projects. On the other hand, companies who conduct post-audits do not consider this reason as important; they probably usually have some system at their disposal.

Statistic verification of the null hypothesis about the differences between the means of two sets of companies can also be done for the earlier question about factors for conducting post-audits (Table 12). These reasons appear to be more important for those companies who do conduct post-audits. However, based on the t-test results, the null hypothesis can't be rejected at $p < 0.05$ level, and the means are also statistically similar. In other words, companies who do conduct post-audits usually value the theoretical benefits of this process more than the companies who do not conduct post-audits. However, it is necessary to add again that p-values were too high in all cases. Therefore, this similarity is also verified only on the analysed set of companies, and it cannot be generalised.

An interesting and valid statement from one of our respondents is:

“Our company has a turnover of approximately two billion per year, and it has thirty-five stores (twenty-seven attendance stores, seven supermarkets, hypermarket, factory). The reason why we do not undertake PAs on all projects is the nature of our business. The majority of our investments are recovery investments (cooling, shelves, visual environment of stores, IT technologies, construction, etc.), and these investments are actually not real investments. For example – we have invested a significant amount in the construction of

children's corner or gift service in one supermarket. Still, we cannot evaluate this contribution in the increase of the number of total customers because there exist other influences (prices, reconstruction of competitor supermarket, etc.). On the other hand, I personally am aware of the importance of PA, and we already make PA for example in the case of investment into self-service cash desk, but this was a unique investment with economic impact. I made the investment evaluation (both during preparation and after implementation) in my previous praxis, but there is always a problem with post-evaluation."

This statement supports the awareness about the importance of post-audits among our respondents.

On the other hand, one respondent claims that:

"The only reason for conducting a post-audit is the grant from EU, where we have to fulfil many documents, reports, and reviews, including financial reports such as post-audit."

While this supports the obligatory nature of performing a post-audit, it also indicates that not all respondents understand the real benefits of undertaking a post-audit and do not consider this process as beneficial for their company.

6. CONCLUSIONS

This exploratory study's primary objectives were to identify CZ companies' post-audit practices and obtain opinions on various post-audit issues. It also sought to assess if these practices mirror those adopted by more developed economies and, if not, identify and evaluate any differences. We believe that this research fulfils its objectives and, as a result, will not only enrich the ongoing debate on post-audits but will fill a literature gap.

Much of the earlier published empirical research in corporate finance has been conducted in Australia, Canada, the USA, and Western European countries. Only recently, attention has been given to emerging markets, including Eastern EU accession/transition countries. The relatively few empirical studies that have been undertaken in Central and Eastern European countries, concerning capital budgeting practices, make no reference to the important post-audit stage and seem to focus mainly on financial (including risk and strategic) investment appraisal models.

Our results show that the number of organisations in the Czech Republic undertaking post-audits is relatively disappointing, especially as the literature points to their importance in learning, controlling, and evaluating management decision-making. However, the results in this respect, are not too dissimilar to those reported in a recent Western European survey.

The reasons for undertaking post-audits correspond with the theoretical objectives. The highest level of importance can be seen in the verification of total profitability of the project (part of a control), followed by identification of under-estimation of costs (part of learning), and improvement of decision making in the future (again, part of the learning process). Other important factors are; 'obtain a better understanding of the investment project' (learning), 'verification of sustainability of the project' (control), and 'identification of benefits not identified at the appraisal stage' (learning). Contrary to recent research findings in Western European companies, *control* is seen as the most important objective of undertaking a post-audit.

Factors for management evaluation have an overall low level of importance. However, a relatively interesting observation is that the assessment of 'blame' and 'success' of the managers are almost identical. Our study suggests that it is just as important to identify *success* (and reward the manager) as *failure* (and blame the manager). These results are

contrary to Western European research findings, which shows that *crediting managers for success* is perceived to be of much greater importance than *apportioning blame for failure*. These are two issues that would benefit from future research.

The evaluation of reasons for not carrying post-audits shows relatively similar opinions of those who do conduct a post-audit and those who do not. The only exception is 'lack of formal post-audit evaluation systems', which is statistically significant and suggests that not having an evaluation system seems to be an important reason for those companies who do not conduct post-audits. On the other hand, companies who conduct post-audits do not consider this reason as important - they may use some other evaluation system.

Although the research may be limited in forming general conclusions because it is based on a relatively small sample size, the respondents consist of senior officials from the Czech Republic's largest companies. The study is exploratory and points the way forward to new lines of research in the area of post-audits of capital projects and should lead to similar studies being undertaken in other Central and Eastern European countries.

We support the literature by asking the question: How can those organisations that do not conduct post-audits ever improve their investment decision-making? From a pragmatic point of view, this research opens a window of opportunity for practitioners in Western European countries to learn from their peers in Central and Eastern European countries and *vice versa*. It is hoped that this study will form a foundation for future research into analysing the problems and benefits of post-audits.

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Table 1. The number of organisations that do/do not conduct a post-audit on capital projects. (n=21)

	n	%
Do conduct PAs on all capital projects	0	0
Do conduct PAs on some capital projects	13	61.9
Do not conduct any capital project post-audits (PAs)	8	38.1

PA adoption rate = 61.9 per cent

Table 2. The total number of projects and the total number of conducted PAs. (n=21)

Numbers	n	%
Total projects	664	100
ICT projects	61	9.2
Total projects with PAs	191	28.8
ICT project with Pas	23	3.5
The decision about undertaking a PA was made during preparatory phase - number of projects	79	
The decision about undertaking a PA was made during implementation phase - number of projects	18	

Table 3. Objectives of post-audits and their level of importance. (n=20)

Objectives:	Degrees of importance						Mean	Median	σ
	1	2	3	4	5	6			
Learning (leading to future improvements in capital investments)	0	1	3	6	6	4	4.450	4.5	1.117
Control (feedback on investment performance)	0	0	1	3	4	12	5.350	6.0	0.910
Evaluation (of management performance)	0	2	4	5	5	4	4.250	4.0	1.260

Notes: The objectives listed above are taken from the views of respondents and are in the line with those expressed earlier in the literature. A Likert-type scale of 1-6 is used, with 1 = not important and 6 = very important.

Table 4. Importance factors given as reasons for undertaking a post-audit. (n=12)

Factors:	Degrees of importance						Mean	Median	σ
	1	2	3	4	5	6			
Apportion blame with respect to "failed" projects	2	2	1	4	2	1	3.417	4.0	1.552
Credit "success" and reward individuals	0	1	5	3	3	0	3.667	3.5	0.943
Correction of vision and mission of the company	2	4	0	2	2	2	3.333	3.0	1.795
Obtain a better understanding of investment projects	0	0	3	1	4	4	4.750	5.0	1.164
Improve decision making in the future	0	0	0	3	4	5	5.167	5.0	0.799
Identification of benefits not identified at the appraisal stage	0	1	2	4	2	3	4.333	4.0	1.247
To identify a need to abandon a project if required (abandonment point)	2	4	1	2	1	2	3.167	2.5	1.724
To identify an opportunity to expand a project (growth option)	0	3	0	6	2	1	3.833	4.0	1.213
Verification, whether the project has fulfilled original estimation	0	0	1	0	7	4	5.167	5.0	0.799
Verification of sustainability of the project	0	0	3	1	6	2	4.583	5.0	1.037
Identify under-estimation of costs	0	0	1	2	3	6	5.167	5.5	0.986
Reduce a manager's possible adverse bias by identifying inflated cash-flow forecasts	0	1	1	5	4	1	4.250	4.0	1.010
Verification of total rentability of the project	0	0	0	1	4	7	5.500	6.0	0.645
Verification of competitiveness of the project	0	2	1	2	6	1	4.250	5.0	1.233
PA is obligatory (ISO certification, etc.)	1	4	2	2	1	2	3.333	3.0	1.599

Notes: A Likert-type scale of 1-6 is used, with 1 = not important and 6 = very important.

Table 5. The reasons for not carrying out a post-audit on all projects (organisations that conducted some post-audits). (n=11)

Reasons given:	Degrees of importance						Mean	Median	σ
	1	2	3	4	5	6			
Lack of qualified personnel to carry out PA	2	1	3	3	2	0	3.182	3.0	1.336
Objective problems in carrying out PA	2	1	3	1	2	2	3.545	3.0	1.725
Lack of formal PA evaluation systems	3	2	4	1	0	0	2.300	2.5	1.005
Lack of support from those involved in project appraisals	4	3	2	1	0	1	2.364	2.0	1.494
Not necessary as we undertake a continual review of major projects	1	2	3	0	2	3	3.818	3.0	1.749
PA is considered to be waste of time	6	3	2	0	0	0	1.636	1.0	0.771
No point if we believe the project is successful	1	2	6	0	1	1	3.091	3.0	1.311
As the external environment is continually changing it is pointless conducting PA	2	4	3	0	1	1	2.727	2.0	1.483
Some projects are accepted on their "strategic" importance and are based on qualitative factors which are difficult to measure after the project has been accepted	1	1	2	3	1	3	4.000	4.0	1.595
The perceived benefits do not support the cost of undertaking a PA	0	5	2	1	1	2	3.364	3.0	1.553
During the realisation of the project has been changed technical equipment, where the evaluation of the project has become very difficult or almost impossible	3	4	2	1	1	0	2.364	2.0	1.226
The amount invested in the project is too small for conducting a PA	1	1	0	1	2	6	4.818	6.0	1.696
The project is not so important or major for the company for conducting a PA	0	1	2	2	4	2	4.364	5.0	1.226

Notes: A Likert-type scale of 1-6 is used, with 1 = not important and 6 = very important.

Table 6. Post-audits: project selection criteria (organisations that conducted some post-audits). (n=12)

Selection criterion:	Degrees of importance						Mean	Median	σ
	1	2	3	4	5	6			
High project cost	0	0	1	1	3	7	5.333	6.0	0.943
High project strategic value	0	0	0	0	5	7	5.583	6.0	0.493
High perceived project risk	0	0	2	0	5	4	5.000	5.0	1.044
High forecasted NPV	0	0	0	3	5	3	5.000	5.0	0.739
Obligation (project supported by subsidies, etc.)	3	2	1	0	1	5	3.750	4.0	2.165
Project is connected with important client	2	1	2	2	2	2	3.636	4.0	1.720

Notes: A Likert-type scale of 1-6 is used, with 1 = not important and 6 = very important.

Table 7. Perceived problems faced in the implementation of post-audit's (organisations that conducted some post-audits). (n=11)

Perceived problems:	Degrees of importance						Mean	Median	σ
	1	2	3	4	5	6			
Inadequacy of data at the project selection stage	2	1	2	3	0	3	3.636	4.0	1.772
Post costs and benefits difficult to identify	1	1	2	1	3	3	4.182	5.0	1.641
Problems associated with project modifications during implementation	1	1	3	4	1	1	3.545	4.0	1.305
Sustainability of the production performance in time and its measurability and prediction	2	1	0	3	4	1	3.818	4.0	1.641
Problems associated with the change of production factors in workplaces	2	1	5	2	1	0	2.909	3.0	1.164
Impossibility of prediction of costs connected with the servicing of machines	3	3	2	1	1	1	2.727	2.0	1.601

Notes: A Likert-type scale of 1-6 is used, with 1 = not important and 6 = very important.

Table 8. Information that should have been known before the investment decision was made (organisations that conducted some post-audits). (n=12)

Selection criterion:	Degrees of importance						Mean	Median	σ
	1	2	3	4	5	6			
Violation of hygiene standards in the workplace (noise, dustiness, etc.)	7	3	1	0	0	1	1.833	1.0	1.404
Change of sell contracts during the project realization	3	5	1	2	1	0	2.417	2.0	1.256

Notes: A Likert-type scale of 1-6 is used, with 1 = not important and 6 = very important.

Table 9. Information that was unlikely to have been known before the investment decision was made (organisations that conducted some post-audits). (n=11)

	Degrees of importance						Mean	Median	σ
	1	2	3	4	5	6			
Market changes	2	1	2	2	2	2	3.636	4.0	1.720
Changes of preferences	1	1	5	1	3	0	3.364	3.0	1.226
Exchange rates differences	3	3	1	3	1	0	2.636	2.0	1.367
Unexpected costs connected with different projects	2	2	4	2	1	0	2.818	3.0	1.192
Problems associated with human factors	1	1	2	5	1	1	3.636	4.0	1.298
Sudden change of political situation	5	3	3	0	0	0	1.818	2.0	0.833
Price increase of basic raw material on the stock exchange	2	1	3	4	0	1	3.182	3.0	1.402
Fires and other environmental disasters	8	1	2	0	0	0	1.455	1.0	0.782
Discovery of new (originally unplanned) order	5	1	4	1	0	0	2.091	2.0	1.083
Discovery of different state of property that was originally considered	4	3	4	0	0	0	2.000	2.0	0.853
Change of the owner of the land or sale contracts on the land during the construction of the new building	7	2	1	1	0	1	2.000	1.0	1.528
Unreliability of the supplier	5	2	1	3	1	0	2.417	2.0	1.441
The entrance of new competitors or activity of current competitors	3	2	3	1	1	1	2.818	3.0	1.585

Notes: A Likert-type scale of 1-6 is used, with 1 = not important and 6 = very important.

Table 10. The reasons for not carrying out a PA on all projects (organisations that do not conduct post-audits). (n=8)

Reasons:	Degrees of importance						Mean	Median	σ
	1	2	3	4	5	6			
Lack of qualified personnel to carry out PA	2	0	1	3	2	0	3.375	4.0	1.495
Objective problems in carrying out PA	2	1	2	1	1	1	3.125	3.0	1.691
Lack of formal PA evaluation systems	1	0	1	3	2	1	4.000	4.0	1.414
Lack of support from those involved in project appraisals	2	0	3	2	1	0	3.000	3.0	1.323
Not necessary as we undertake a continual review of major projects	0	0	3	1	2	2	4.375	4.5	1.218
PA is considered to be waste of time	3	2	2	0	1	0	2.250	2.0	1.299
No point if we believe the project is successful	1	1	2	1	3	0	3.500	3.5	1.414
As the external environment is continually changing it is pointless conducting PA	2	1	3	2	0	0	2.625	3.0	1.111
Some projects are accepted on their "strategic" importance and are based on qualitative factors which are difficult to measure after the project has been accepted	0	0	1	1	2	4	5.125	5.5	1.053
The perceived benefits do not support the cost of undertaking a PA	0	1	0	3	4	0	4.250	4.5	0.968
During the realisation of the project has been changed technical equipment, where the evaluation of the project has become very difficult or almost impossible	1	2	1	4	0	0	3.000	3.5	1.118
The amount invested in the project is too small for conducting a PA	1	0	2	3	0	2	3.875	4.0	1.536
The project is not so important or major for the company for conducting a PA	0	1	0	6	0	1	4.000	4.0	1.000

Notes: A Likert-type scale of 1-6 is used, with 1 = not important and 6 = very important.

Table 11. The reasons for not carrying out a PA on all projects – statistical verification.

Reasons given	Mean degree of importance		Difference
	Organisations that conducted some post-audits	Organisations that do not conduct any post-audits	
	Mean _A	Mean _B	t-values
Lack of qualified personnel to carry out PA	3.18	3.38	0.280
Objective problems in carrying out PA	3.55	3.13	0.500
Lack of formal PA evaluation systems	2.30	4.00	2.806**
Lack of support from those involved in project appraisals	2.36	3.00	0.910
Not necessary as we undertake a continual review of major projects	3.82	4.38	0.732
PA is considered to be a waste of time	1.64	2.25	1.216
No point if we believe the project is successful	3.09	3.50	0.614
As the external environment is continually changing it is pointless conducting PA	2.73	2.63	0.156
Some projects are accepted on their "strategic" importance and are based on qualitative factors which are difficult to measure after the project has been accepted	4.00	5.13	1.644
The perceived benefits do not support the cost of undertaking a PA	3.36	4.25	1.348
During the realisation of the project has been changed technical equipment, where the evaluation of the project has become very difficult or almost impossible	2.36	3.00	1.096
The amount invested in the project is too small for conducting a PA	4.82	3.88	1.178
The project is not so important or major for the company for conducting a PA	4.36	4.00	0.651

Notes: Two-tailed test used for analysing the difference in means between those organisations that conduct post-audit and those organisations that do not. **Significant at the $\alpha = 5$ per cent level.

Table 12. Objectives of post-audits and their level of importance – statistical verification.

Reasons given	Mean degree of importance		Difference
	Organisations that conducted some post-audits	Organisations that do not conduct any post-audits	
	Mean _A	Mean _B	t-values
Learning (leading to future improvements in capital investments)	4.62	4.14	0.874
Control (feedback on investment performance)	5.46	5.14	0.719
Evaluation (of management performance)	4.38	4.00	0.624

Notes: Two-tailed test used for analysing the difference in means between those organisations that conduct post-audit and those organisations that do not.