Time and Budget Overruns on Czech International Development Projects[1]

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Abstract

Projects are common means of implementing development co-operation. However, their success rate is a topic of numerous discussions as they are often delayed or delivered with increased costs. There are several reasons for this phenomenon, such as procurement issues, management issues, inadequate project design, and country specific causes e.g., inflation, corruption, natural environment etc. This study tries to establish what factors influence these overruns on projects funded by the Czech Republic and with the use of Pearson's and Fisher's tests suggests that financial results are affected by the type of implementing agency, developing country, type of financing, project size and project sector, while the schedule is influenced only by the project sector and size. Based on these results, a new risk factor matrix is introduced to determine how project management tools should be required on particular projects in order to increase their success rate.

Keywords: *Czech development aid, international development projects, budget overrun, time overrun, Pearson's Chi-square test*

JEL Classification: O22, F35, F36

DOI: https://doi.org/10.31577/ekoncas.2022.07-8.04

Introduction

For the majority of state and multilateral donors, projects are the common means of their development assistance delivery. However, the success rate of these projects is a topic of numerous discussions (Lazima and Coyle, 2019; Hekala,

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[1] This work was supported by an IGA project called *Případové studie a studie nejlepších praxí v rozvojových studiích – měření efektivity v managementu přírodních zdrojů, projektového managementu rozvojové pomoci a přejímání dobrých praxí v rozvoji programů základního vzdělávání v rozvojových ekonomikách*, No. 6/F2/15/2022 registered at University of Economics and Business.

2012; Ika et al., 2011; Bulman et al., 2015). Studies on World Bank's (WB) projects, for instance, indicate that only 3% of their interventions were evaluated as highly satisfactory between 2014 and 2016, and only one in four of the WB's projects managed to finish at least with a moderate success during that time (Rodríguez-Rivero et al., 2020). Even prior this period though, the success rate was not much higher, as over 50% of the WB's development projects were evaluated as unsuccessful before 2000 (Ika et al., 2012) and also till mid 2010s (Bulman et al., 2015).

Nevertheless, project failures have been reported directly from the developing countries as well. A Nigerian audit report reveals that almost 12 thousand development projects funded by the Nigerian government were completely abandoned between 1971 and 2011 (Okereke, 2017) and Okereke (2017) estimate, the total would be much higher, should foreign development projects be accounted for as well. Similar experience can be heard also from other countries, such as Pakistan, Ghana or Mali (Boakye and Liu, 2016).

Not only implementation of international development (ID) projects, but also the evaluation of their success might prove a challenge. The ID project success is a relative term which depends on the lenses of project stakeholders and the selected success criteria (Eja and Ramegowda, 2020). OECD (2019) proposes six broad criteria that might be taken into account when evaluating the international development interventions, namely relevance, coherence, effectiveness, efficiency, impact, and sustainability. This article looks deeper into the fourth one – efficiency – which describes whether the intervention was delivered in an economic and a timely manner (OECD, 2019). More specifically, this study analyses ID projects of a Central European donor, the Czech Republic, in order to find out what factors influence the budget and schedule variations on those projects.

Findings of this analysis might contribute to the current debate in several ways. Firstly, donors tend to put their aid budget under scrutiny during challenging times (Devex, 2011; Mawdsley, 2015; Rozbicka and Szent-Iványi, 2019), which economic downturns, Covid-19 or political turbulence surely are. While some donors still strive to honour their international pledges and keep their aid levels untouched, some countries such as the United Kingdom or Norway already declared major cuts of their aid budgets (Chadwick, 2022; Worley, 2022). Voices calling for development aid reduction can be also heard in the Czech political discussions (ČTK, 2022). Under such conditions, delivering projects on time and within budget might play a crucial role for securing future aid funds and making sure of their efficient use.

Secondly, cost and schedule overruns might have a negative impact on the aid-receiving countries, local communities, contractors and other stakeholders alike (Gbahabo and Ajuwon, 2017; Eja and Ramegowda, 2020). Implementation of improvement suggestions might thus positively influence the project outcomes and mitigate these negative effects. And thirdly, although the Czech Republic is a small player among the state and multilateral donors (OECD, 2022a), the improvement suggestions could be replicated or adjusted for other Central European donors as well.

Factors examined in this paper are those that enter into consideration already in the tendering phase and determine the character of the projects during its whole duration. These are type of implementing agency, aid-receiving country, type of financing, projects size, and project sector. Research questions of this paper are: what factors influence financial results of the Czech ID projects? What factors influence time results of the Czech ID projects? And how to set an appropriate project management approach to limit budget and time overruns?

This study is structured as follows. In the first chapter, more detail is given about the Iron Triangle concept. Furthermore, it also describes some specific examples and the most common causes of these overruns. The second chapter outlines used researched methodology and variables, which is followed by the presentation of the results of the analysis. The final chapter discusses these results and comes with practical improvement suggestions. The article closes with a short conclusion.

1. Budget and Schedule Overruns on ID Projects

Cost, time and quality are the three key project performance criteria that form together the Iron Triangle of project management (PM4DEV, 2014; Pollack et al., 2018; Lazima and Coyle, 2019; Atkinson, 1999). This concept has been widely accepted since the 1970s and, thanks to its simplicity, it still remains a common framework for measuring project success till today (Pollack et al., 2018; Atkinson, 1999; Judgev and Müller, 2015): White and Fortune (2002) indicate that majority of project managers will consider their projects successful should they deliver it to these above-mentioned criteria. The popularity of the Iron Triangle is not even hindered by the fact that the overall project result is more complex and includes also external factors such as stakeholder involvement, economic sustainability, delivered project benefits, satisfaction of the client etc. (Hermano et al., 2013; Golini et al., 2014).

To manage the ID project successfully in terms of the Iron Triangle, the project manager needs to have a clear understanding prior of the project start what

are the priorities agreed by the donor agency, implementing organisation, and other key stakeholders. The three parts of the Iron Triangle are closely interconnected and their balance strongly depends on these priorities (PM4DEV, 2014). In general, the main focus on ID projects is on the cost part, due to the corruption and due to the fact that these projects are funded by the taxpayer money (Khang and Moe, 2008). However, should one of the criteria come off this balance, a trade-off with one or all of the other criteria might be needed (PM4DEV, 2014; Lazyma and Coyle, 2019; Pollack et al., 2018).

Despite the close focus on schedule and cost control, both time and budget overruns are common on projects across countries and industries, however, as Cantarelli et al. (2012) suggests some countries are more prone to overruns than others, with developing countries achieving worse results than Europe or the US. Data on Asian Development Bank's (ADB) projects in Indonesia, China, India and Bangladesh (Ahsan and Gunawan, 2010) confirm this hypothesis as they indicate that on average 86% of their projects were delivered after the originally planned completion date and 14% exceeded their budget. As a result, only 13% of these ADB's projects managed to be completed within both their schedule and budget. Also state donors are experiencing similar trend in Asian aid-receiving countries: Japan, for instance, completed only 14% of its ID projects in Vietnam (Kaimasu and Ao, 2016) and 16% of its ID projects in Indonesia (Kaimasu et al., 2017) within their schedule and budget.

When looking directly at aid-receiving African countries, cost and time overshoots on ID projects seem to be frequent as well. Development projects in Kenya recorded cost and time overruns in 71% of cases in agriculture and in 68% in construction (Gbahabo and Ajuwon, 2017). In Ghana, 75% of water related ID projects did not finished as planned time- and cost-wise and in Nigeria, development infrastructure projects exceeded their schedule on average by 188% and their cost by 14% (Gbahabo and Ajuwon, 2017).

There are several causes of time and cost overruns on ID projects. The first group of reasons is connected to the political pressures, and with cultural, natural and economic environment in the host country (Gbahabo and Ajuwon, 2017; Shafiei and Puttanna, 2021; Boakye and Liu, 2016; Eja and Ramegowda, 2020; Nzekwe et al., 2015; Ahsan and Gunawan, 2010; Khang and Moe, 2008). When looking at the political pressures, ID projects, especially the complex ones, are prone to political manipulation in both countries (Khang and Moe, 2008), and in order to get the project started, risks and costs can be underestimated, while the project benefits can be exaggerated (Gbahabo and Ajuwon, 2017). This manoeuvre might be used primarily before elections with the intention to prove to voters that their funds are used efficiently and to quickly deliver visible outcomes (Gbahabo and Ajuwon, 2017). Other political reasons causing ID projects to finish with

overruns are high corruption and political instability in the host country (Eja and Ramegowda, 2020). Moreover, ID projects often get behind schedule already before their initial project kick-off as a number of approvals from both donor's and aid-receiver's authorities might be needed before the actual project start (Ahsan and Gunawan, 2010; Boakye and Liu, 2016). Once ready, it is often necessary to replan the project schedule to adjust it to the new conditions. Nevertheless, this is rarely done as such re-planning would require additional cost that was not accounted for (Boakye and Liu, 2016). As for the economic reasons, cost increases are often associated with unexpected high inflation and volatile exchange rates of the local currency (Gbahabo and Ajuwon, 2017; Nzekwe et al., 2015; Ahsan and Gunawan, 2010). And finally, both time and costs are affected also by natural disasters in the host country (Ahsan and Gunawan, 2010).

The second group of reasons causing ID projects to overshoot their schedule and budget is connected to poor project planning and implementation (Gbahabo and Ajuwon, 2017; Boakye and Liu, 2016; Eja and Ramegowda, 2020; Hekala, 2012; Shafiei and Puttanna, 2021; Pager, 2015; Abbasi et al., 2014). It is essential for donors to have a fairly accurate idea of the project characteristics at the early stage of the project to be able to decide whether to proceed with it or not (Gbahabo and Ajuwon, 2017). However, these cost and schedule estimations are at that time only guesses calculated when least information is available about the project (Atkinson, 1999). Beside the inefficient cost and schedule estimation, ID projects might also suffer from inappropriate project design (Shafiei and Puttanna, 2021; Boakye and Liu, 2016; Nzekwe et al., 2015), resulting in unclearly defined project goals and objectives (Abbasi et al., 2014). Without a clarity over these, team members might be unsure about their responsibilities and expected outcomes of their work and might thus miss project milestones, run into personality clashes or upset project stakeholders, which might delay the project implementation and increase the project cost (Shafiei and Puttanna, 2021).

Even if the project is designed correctly, there is still a risk of overruns during the project implementation. As ID projects might take place in an unsafe environment or might require a specific knowledge, hiring and talent management might prove a real challenge as well (Shafiei and Puttanna, 2021; Boakye and Liu, 2016; Gbahabo and Ajuwon, 2017; Ahsan and Gunawan, 2010). On one hand, highly-skilled ID consultants and professionals might require high fees, putting the original budget under pressure (Hekala, 2012), but on the other hand, if less experienced workers and volunteers are recruited, the team might lack the necessary knowledge and senior management to ensure the outcomes are delivered as planned (Abbasi et al., 2014). Finally, the project implementation might be hindered by the slow process of conducted works (Ahsan and Gunawan, 2010).

The third group of possible causes for both cost and schedule overruns is problematic procurement (Shafiei and Puttanna, 2021; Gbahabo and Ajuwon, 2017; Ahsan and Gunawan, 2010; Nzekwe et al., 2015). As project sponsors tend to focus mainly on costs (Khang and Moe, 2008) and the lowest bid might win, organisations might underestimate their budgets in order to be awarded the project (Gbahabo and Ajuwon, 2017). Due to this fact and due to corruption, incompetent suppliers might be selected that might not be able to deliver the project as planned (Nzekwe et al., 2015). Furthermore, projects might be delayed due to lengthy contract signing (Ahsan and Gunawan, 2010).

And last but not least, the fourth group of reasons causing ID projects to overshoot their budgets and schedules arises from project management issues (Pager, 2015; Shafiei and Puttanna, 2021; Gbahabo and Ajuwon, 2017; Nzekwe et al., 2015; Hekala, 2012; Boakye and Liu, 2016; Abbasi et al., 2014). Professionals leading ID projects are often accidental project managers: they have subject matter expertise about the project area, but seldom possess any formal education or knowledge about project management (Hekala, 2012). As they are not skilled in this discipline, they might not apply available tools and control mechanisms to manage all relevant factors to successfully deliver the project outcomes as planned (Hekala, 2012; Nzekwe et al., 2015). Besides, ID project managers might struggle with communication, which is crucial for successful project completion (Boakye and Liu, 2016). Finally, inexperienced project managers might be unaware of the best practices in reporting and monitoring, thus inadequately informing donors and project sponsors about any project challenges and potential risks to project deadlines and costs (Shafiei and Puttanna, 2021; Eja and Ramegowda, 2020).

2. Methodology

The Czech Republic is one of the smallest OECD donors as it provided only 0.13% of its GNI to development co-operation in 2021 (OECD, 2022b). From the outset, the Czech Republic has channelled aid mostly through the multilateral system and since its accession to the European Union (EU) mainly through the EU institutions (OECD, 2022c). Over the time, however, support for bilateral aid increased and accounted for more than 20% of total official Czech aid between 2009 and 2019, and for 18% in 2020 (OECD, 2022c).

As the Czech Republic cannot influence the form of provided multilateral aid, this article focuses only on bilateral projects fully or partially funded by the Czech Development Agency (CzDA). International development projects implemented by the Czech Ministries of Finance, Interior Affairs, and Trade and Industry are

not included in this analysis due to their specific character. Moreover, only bilateral projects run abroad are considered; projects implemented in the Czech Republic, trilateral and B2B projects are excluded from the analysis.

The analysis is conducted on non-public data that were obtained from the CzDA through the request for information based on Act on the Free Access to Information. The dataset contains information on projects funded by the CzDA from 2016 till 2019 as the CzDA implemented changes in their monitoring in 2015 and older data might cause inconsistencies. Data for 2020 were not provided by the CzDA to the author. The information was provided on annual basis and included 559 yearly projects in total. More specifically, it included 158 projects in 2016, 171 protects in 2017, 134 projects in 2018, and 96 projects in 2019. To evaluate the overall project results, the annual data were consolidated and in the end 369 projects are considered in this study.

Two separate analyses were conducted: one for financial results and one for time results. The dependant variable in the financial analysis is defined as the difference between planned and final budget of the whole project measured in Czech crowns (CZK). This variable enters the analysis in three categories, i.e., under the budget (37%), exactly on the budget (57%), and over the budget (6%). Under the budget category includes all projects that did not utilise all the allocated funds for various reasons and contains projects that returned from 17.5 million CZK to two CZK. The average of this category is one million CZK and median value is 192.1k CZK. Exactly on the budget category comprises of projects that used up all their allocated budget. Over the project category includes projects that exceeded their budgets with minimum 161 CZK to maximum 3.8m CZK. The average value is 228.7k CZK. Details to each factor are presented in Table 5 in the appendix.

The dependant variable for schedule analysis is defined as the difference between planned and final project duration. As the CzDA does not track whether their projects are prolonged or delayed, a comparative analysis was run on the annual data. The delays are therefore measured in years and enter the analysis in two categories, i.e., projects finished on time (84%) and projects finished with delays (16%). Projects completed on time were finished within the planned schedule. Projects finished with delays were prolonged by minimum one year and maximum three years, with the average and median delay being one year. Details to each factor are presented in Table 6 in the appendix.

The independent variables that are used in this analysis are factors that determine the project character during its whole life-cycle. The factors, their categories and share of their projects on the total are as follows:

1. *Implementing agency*. This factor includes five categories, i.e., private companies (45%), non-profit organisations (30%), state institutions including universities and municipalities (22%), international organisations (1%) and a combination of those above (1%). The type of implementing agency might affect project schedule and cost for numerous reasons. First, these organisations are responsible for procurement on their projects, which was one of the main causes for overruns mentioned in the literature review (Shafiei and Puttanna, 2021; Gbahabo and Ajuwon, 2017, etc.) and each organisation type might have different procurement approach. Secondly, each organisation operates with different talent structure: while NGOs might often rely on volunteers and enthusiasts, private firms implement projects mainly with their own staff and contractors. This affects also the project management maturity of these organisations as NGOs might often use accidental project managers to lead their projects and apply best-practices only seldomly (Golini et al., 2014; Hekala, 2012; Czahajda, 2019). It is therefore expected that this variable will influence both schedule and budget.

2. *Type of financing*. This variable includes public procurement (62%), grants (30%) and budgetary measures (8%). The financing scheme strongly correlates with the type of implementing agency, however, does not fully overlap it as projects led by private companies and a combination of implementers were funded solely as a public procurement, but NGOs manage both grants and public procurement financing, with grants being more prevalent. State institutions and international organisations use all type of financing schemes. Brunt and Casey (2022) and Rosenberg (2017) mention that grants are more solution oriented and organisations can thus define the project specifications already in the tendering phase to match their mission and expertise. With public procurement, on the other hand, organisations come already to clearly defined projects and compete to win the tender with the lowest price (Gbahabo and Ajuwon, 2017; Rosenberg, 2017). It is expected that financing will affect both schedule and budget as well.

3. *Total project size*. This variable is calculated as a sum of planned annual budgets per projects in CZK. It is divided into three categories, i.e., small projects with their budget till one million CZK sharp (39%), mid-size projects from one million to four million CZK sharp (30%) and large projects above four million CZK (30%). This division was set by the author in order to create categories of similar size, while keeping some logical numerical boundaries. The project size can influence the project success for various reasons. Firstly, larger projects are often more complex and include more stakeholders, which makes them more challenging to manage as each stakeholder tries to protect and push through their own interests in the projects, even though their interests might be opposite to those of the project owner (Ceric, 2014). Secondly, larger projects enjoy greater

publicity and appear in the spotlight of the local government that might attempt to influence the project to reflect their interests (Locatelli et al., 2017). And thirdly, the possibility of overruns increases with the project size (Flyvbjerg et al., 2003). It is therefore expected that this factor will influence both time and budget.

4. *Project sector*. The CzDA funds projects in 11 sectors, i.e., agriculture (27%), water (15%), state government and civil society (14%), education (13%) health care (10%), social care (9%), energy (8%), disasters (2%), forestry (1%), environment (1%), and mining (1%). Each project is unique, however, projects run within one sector might share some common similarities. Migration projects, for instance, are often designed and implemented in haste with short deadlines to address immediate pressing issues (GIZ, 2020) and infrastructure projects are, for example, often funded in a form of a public-private partnership (Gbahabo and Ajuwon, 2017). Moreover, "hard" projects with construction and engineering work tend to finish with time and budget overruns more often than "soft" projects (Ahbab et al., 2019). It is therefore expected that this variable will influence both time and budget.

5. *Aid-receiving countries*. This factor includes 12 countries, namely Bosnia and Herzegovina (21%), Georgia (21%), Moldova (18%), Ethiopia (12%), Ukraine (8%), Cambodia (5%), Mongolia (4%), Zambia (4%), Kosovo (2%) Serbia (2%), Afghanistan (2%), and Palestine (1%). As mentioned in the literature review, budget and schedule overruns on projects are common, but their size may depend on the location, because delays and cost increases are frequently connected to country specific factors, such as inflation, exchange rate volatility, or political pressures and natural conditions (Gbahabo and Ajuwon, 2017; Shafiei and Puttanna, 2021; Eja and Ramegowda, 2020 etc.). It is therefore expected that this variable will influence both time and budget.

A correlation analysis of these factors was conducted and its results are presented in Table 7 in the appendix. The analysis shows that type of financing correlates strongly with the implementing agency and moderately with project size and aid-receiving country. Other variables correlate only weakly with each other.

Methodological approaches to the analysis of time and budget overruns are similar regardless of the industry, with the commonly used methodology being the Pearson's chi-squared test that was employed for example for IT projects by Benschop et al. (2020) or for construction projects by Zende and Shinde (2017), Furumo et al. (2006) a Devi a Ananthanarayanan (2017). To apply the Pearson's test, few requirements must be met to ensure the suitability of the test (Turhan, 2020): (i) observations must be collected randomly, (ii) the categories cannot consist of a small number of items, (iii) all items in the dataset must be independent,

and (iv) the data set must contain at least 50 items. With datasets containing categories represented by a small number of observations, it might be problematic to fulfil condition (ii) and Benschop (2020) therefore suggests to combine less frequent categories into one with more observations or to use another test.

T a b l e 1

Adjustment to the Data Set

	Budget analysis				Schedule analysis		
Factor/category	**under**	**on**	**above**	**new category**	**on**	**above**	**new category**
Implementing agency	**136**	**212**	**21**		**310**	**59**	
NGO	25	84	2	NGO	92	19	NGO
State institution	18	63	2	Other	66	17	Other
International	1	1	1	Other	3	0	Other
Private company	88	63	16	Private	145	22	Private
Combination	4	1	0	Other	4	1	Other
Type of financing	**136**	**212**	**21**		**310**	**59**	
Grant	7	103	1	Other	94	17	Grant
Budgetary measure	0	29	2	Other	24	7	Budgetary measure
Public procurement	129	80	18	Public procurement	192	35	Public procurement
Project size	**136**	**212**	**21**		**310**	**59**	
Till 1m CZK	67	65	13	Till 1m CZK	135	10	Till 1m CZK
1m – 4m CZK	32	74	6	1m – 4m CZK	93	19	1m – 4m CZK
Above 4m CZK	37	73	2	Above 4m CZK	82	30	Above 4m CZK
Sector	**136**	**212**	**21**		**310**	**59**	
Energy	16	9	4	Energy	21	8	Energy
Disasters	0	6	0	Other	5	1	Other
Forestry	1	3	0	Other	1	3	Environment
Social care	7	27	0	Other	30	4	Social care
State administration and civil society	9	38	5	State admin	47	5	State admin
Mining	0	1	0	Other	1	0	Other
Water	27	24	4	Other	48	7	Water
Education	14	32	1	Other	34	13	Education
Health care	23	15	0	Other	34	4	Other
Agriculture	38	53	7	Agriculture	86	12	Agriculture
Environment	1	4	0	Other	3	2	Environment
Aid-receiving country	**136**	**212**	**21**		**310**	**59**	
Afghanistan	0	6	0	Asia	6	0	Other
Bosnia and Herzegovina	33	33	12	Bosnia and Herzegovina	66	12	Bosnia and Herzegovina
Ethiopia	14	29	1	Africa and ME	37	7	Ethiopia
Georgia	28	45	3	Georgia	67	9	Georgia
Cambodia	7	13	0	Asia	17	3	Cambodia
Kosovo	1	6	0	Europe	6	1	Other
Moldova	26	40	2	Europe	59	9	Moldova
Mongolia	6	7	1	Asia	11	3	Mongolia
Palestine	2	2	0	Africa and ME	4	0	Other
Serbia	3	4	1	Europe	7	1	Other
Ukraine	13	17	1	Europe	21	10	Ukraine
Zambia	3	10	0	Africa and ME	9	4	Zambia

Source: Created by author.

Some of the categories indeed consisted of only a low number of observations and were therefore merged into one category. To keep a logical division, less numerous categories were merged based on their similarities where feasible, or were summed in "other" category if no other combination was possible. The composition of categories varies for budget and schedule analysis. Adjustments of the data set and grouping into categories is summarised in Table 1 above. The first column lists all factors and their original categories, the next three columns show how many of them finished under, on and above budget and the following column indicates how this category enters the analysis. The last three columns present the same for schedule analysis.

As for the quality of achieved results, the analysis uses data from evaluation reports published by the Ministry of Foreign Affairs on their website. The Ministry does not run a regular evaluation of all their projects, but select few for a deeper review. When comparing the published evaluation reports with the provided data on time and budget, only six projects from the dataset were reviewed. Due to such low number, the analysis is conducted in narrative.

3. Results

The tables for both financial and time results analysis are structured as follows: first, the results of Pearson's test are given (1) and then, where applicable, results of Fisher's test are indicated (2).

First, the budget analysis was performed. The results of Pearson's test suggest, that financial outcomes of Czech bilateral international development projects funded by the Czech Development Agency and implemented abroad are influenced by all researched factors, i.e., the implementing agency, type of financing, project size, project sector and the aid-receiving country. Fisher's test was possible only for type of financing and confirms its statistical significance. Results are summarised in Table 2 below.

T a b l e 2

Factors and Their Influence on Financial Results

	(1)			(2)
Variable	**χ2**	**df**	**p-value**	**p-value**
Implementing agency	46.487	4	1.951e-09	–
Type of financing	115.23	2	2.2e-16	2.2e-16
Project size	16.156	4	0.002817	–
Sector	21.469	6	0.001511	–
Aid receiving country	23.626	8	0.002647	–

Source: Created by the author.

A zoom on implementing agency reveals that cost variation (both under- and overruns) is higher for private companies than for other organisations. As for overruns, private companies exceeded their budget in 10% of cases while NGOs and state institutions overshot it only in 2% of cases. Also, the average overrun of private firms was higher than that of the non-profit and public sector. This finding suggests that in the case of Czech aid, the for-profit sector does not achieve better results than other implementing agencies. When looking at underruns, the variance and absolute values of unutilised funds are also greater for private firms (53% of cases) than for NGOs (23% of cases) and state institutions (22% of cases). The reason for these findings might be connected to the next variable, type of financing. There is a strong correlation between implementing agency and funding scheme: NGOs receive funds from CzDA mainly as grants which are more solution based, while private companies compete solely in public procurement tenders where solution is already defined by the awarding authority (Brunt and Casey, 2022; Rosenberg, 2017). Therefore, NGOs might set a more precise forecast from the very outset. Although there are grants with budget underruns, those cases are less frequent and on lower value then in projects funded as public procurement.

The next variable influencing financial results of projects is the project size. While the value of budget underruns and overruns rises with the project size, the share of projects with overruns decreases as the project size increases: 9% of small projects exceeded their budget, while only 2% of big projects finished over their budget. As literature (Ceric, 2014; Locatelli et al., 2017; Flyvbjerg et al., 2003) suggests, larger projects are more complex to manage and more prone to political manipulation and corruption. Therefore, these projects might be monitored more closely and be led by more experienced project managers, thus achieving less frequent budget overruns.

Financial results are also affected by the project sector. Czech projects finish with budget overrun only in five out of 11 sectors, namely in energy (14% of cases), state administration (10%), water (7%), agriculture (7%) and education (2%), which partly corresponds with the reports from African aid-receiving countries where water, agriculture and construction project frequently exceeded their initial cost (Gbahabo and Ajuwon, 2017). This finding might be partially explained with Ahbab et al. (2019) hypothesis that hard projects with construction and engineering work tend to finish with budget and time overruns. Closer investigation of the data set revealed that more than half of the costly and delayed projects included supply of machinery, construction or other technical works. The overruns happened regardless of the project size, whereas soft projects with budget overruns were mainly small projects till 1m CZK.

The financial results are also influenced also by the aid-receiving country. The most frequent budget overruns can be observed in close geographical proximity in Balkan countries, more specifically in Bosnia and Herzegovina (15% of cases) and Serbia (13% of cases). Projects implemented in farther locations were less inclined to overruns as only Mongolia had a share of over-budget projects higher than 5%. Many countries did not have any budget overruns in the research period at all; these include Zambia, Cambodia, Afghanistan, Palestine and Kosovo. Also absolute values of budget overruns were higher in Europe with the highest located in Bosnia and Herzegovina, Moldova, Georgia and Ukraine. To find the reason behind the frequent cost overruns in Balkan, a comparison with other partner countries of Czech aid in terms of inflation, exchange rate volatility and corruption was run. This shows that neither Bosnia and Herzegovina, nor Serbia scored the worst in any of these categories. As per inflation, both states recorded slightly negative or maximum 2% inflation between 2016 and 2019 (World Bank, 2022), while in countries like Ukraine or Ethiopia, this indicator was well above 10%. Similarly, when looking at the exchange rate change of the local currency to CZK, other partner currencies were more volatile (FXTop, 2022). And finally, based on the Transparency International Corruption index (Transparency International, 2022), both countries ranked around the middle range: Bosnia and Herzegovina ranked 110 out of 180 and Serbia 96 out of 180.

Second, the schedule analysis was performed. On contrary to financial results, the results of Pearson's test suggest, that schedule results of Czech bilateral international development projects funded by the Czech Development Agency and implemented abroad are influenced only by project size and project sector. Fisher's test confirms the statistical significance of project size, however, was not possible for project sector. Results are summarised in Table 3 below.

T a b l e 3

Factors and Their Influence on Schedule Results

	(1)			(2)
Variable	**χ2**	**df**	**p-value**	**p-value**
Implementing agency	2.0643	2	0.3562	0.3639
Type of financing	1.0952	2	0.5783	0.542
Project size	19.0500000	2	7.302e-05	5.472e-05
Sector	22.438	7	0.002134	–
Aid receiving country	11.112	8	0.1955	–

Source: Created by the author.

Closer look at project size suggests a link between size and delays: a larger project size means more frequent and longer delay. Large projects ended up with a delay in 27% of cases and were delayed by 0.3 years on average, mid-size

projects finished with a delay in 17% of cases and were delayed by 0.2 years on average, while small projects were prolonged only in 7% of cases with the average delay of 0.1 year. Similarly, to cost overruns, more frequent time overruns are connected to the complexity of such projects and a greater number of stakeholders (Ceric, 2014; Locatelli et al., 2017). Also, as the main focus on these projects might be on keeping the costs as planned, the project managers might need to trade-off this variable with the other categories in the Iron Triangle.

The second factor influencing the schedule is project sector: based on the provided data, all sectors with the only exception of mining suffered from delayed projects, however, the most frequent schedule overruns are in forestry (75% of cases), environment (40% of cases) and energy (28% of cases). Projects are delayed regardless of their sizes; however, it seems that for agriculture and water sectors, the bigger the project, the more frequent delay is. Explanation might be the same as described at budget overruns.

Although the implementing agency does not have a statistically significant impact on project delays, it is worth mentioning that for-profit firms finish their project with less frequent (13% of cases) and lower (0.1 years on average) delays than non-profit organisations (17% of cases and 0.2 years on average).

In general, a clear trend can be observed in the analysis: projects often focus only on one part of the Iron Triangle and trade-off with others, meaning that projects that achieve good results finance-wise finish with delays and *vice versa*. This fact can be illustrated on projects in Zambia from which none exceeded their budget, but 31% of them ended up with a delay. Similarly, none of the forestry projects (4 in total) finished over their budget, but 75% of them were implemented behind schedule.

The third part of the triangle – quality – was analysed from the evaluation reports that included three projects from Bosnia and Herzegovina, one project from Georgia, one from Zambia and one from Cambodia. The quality of delivered scope was evaluated rather positively, however, few issues were identified. For hard projects, the deficits were linked to inadequate project planning (parts of agricultural equipment were not used as they proved unsuitable for the local conditions) and inadequate project implementation (local premises were not prepared both technically and financially to connect to the new plant). As for soft projects, the quality was rated as positive, however, few issues were also mentioned, mostly related to the sustainability of results (the project outcomes were delivered, but were not used after the project end). Furthermore, the reports also frequently mentioned issues connected to the project management and design, with the biggest gaps identified being the lack of SMART goals and clearly defined outcomes (MZV, 2022).

4. Discussion and Recommendations

The findings of this analysis can be used to suggest changes of the aid framework in the Czech Republic. The recommendations focus on project management and propose to adjust the requirements based on project characteristics. Although existing studies (Golini et al., 2014; Matos, 2019; Montes-Guerra et al., 2015; Czahajda, 2019) indicate that the application of project management methodologies throughout the project life-cycle may influence the project results, the CzDA requires only a logical framework document at the beginning of the project, but does not provide any guidelines regarding the PM tools for the project implementation phase (CzDA, 2016).

As the results are affected by a different combination of factors, it might not be advisable to require a standard set of PM tools on all projects as this would only increase the administrative burden and might not improve the project results anyway.

Therefore, it is recommended to require only a basic set to PM tools and an additional set of tools which should be applied in case a project falls into a risk category. This scheme should help the project managers deal with the challenges and increase the chance that the project will finish within the planned time and budget.

Golini et al. (2014) argues that the basic set of PM tools that positively influences the project success includes a logical framework, progress reports, cost accounting, risk management and Gantt chart. This study was conducted on ID projects implemented by project managers from various cultures, however, subsequent research (Montes-Guerra et al., 2015; Czahajda, 2019; Keleckaite, 2015; Montes-Guerra, 2015) indicate that this set varies geographically. Further research on the basic set for Czech projects will therefore follow to identify tools applicable for the Czech environment.

Based on the analysis, the following risk factor matrix might be suggested: on its vertical axis, researched factors are listed, and the horizontal axis indicates whether the particular factor affects budget or time and which categories are considered as risky (in this study, a level of more than 5% share of overruns was selected).

A required pre-requisite for the implementation of such system is a regular data update to ensure this matrix is still up-to-date and can still deliver the best results. It would be recommended to upgrade this matrix every two to three years to collect recent data, but not to pose extra administrative tasks to the CzDA employees.

The matrix created based on 2016 to 2019 data is presented in Table 4 below.

T a b l e 4

Risk Factor Matrix

Factor	Impact on budget	Risk categories	Impact on time	Risk categories
Implementing agency	yes	Private companies; International organisations	no	
Type of financing	yes	Public procurement; Budgetary measure	no	
Project size	yes	Small; Mid-size	yes	Small Mid-size; Large
Project sector	yes	Energy; State administration and civil society; Water; Agriculture	yes	Energy; Disasters; Forestry; Social care; State government and civil society; Water; Education; Healthcare; Agriculture; Environment
Aid-receiving country	yes	Bosnia and Herzegovina; Mongolia; Serbia	no	

Source: Created by the author.

Conclusion

This study looks into the result of international development projects, specifically on the time and budget overruns. There are several reasons for these overruns, for example procurement issues, talent and project management issues, inappropriate project design and delivery, and country specific factors such as inflation, corruption, natural environment etc.

With the use of Pearson's and Fisher's tests, this study investigates ID projects funded by the Czech Development Agency between 2016 and 2019 and estimates what factors influence their results in terms of schedule and budget. As per cost overruns, the results show that they are influenced by the type of implementing agency and financing, project size and sector and the aid-receiving country. It furthermore suggests that the cost variation is higher and more frequent amongst private firms, in Balkan countries and in the energy and state administration sector. As per time overruns, these are influenced by the project size and sector, with the highest and most frequent overruns happening on more complex projects and in forestry and environment.

The third research question focused on how to set an appropriate project management approach to decrease the frequency and size of budget and time overruns. A new scheme was suggested that proposes how project management

tools should be required by the CzDA and used by the implementing organisations. This scheme includes a basic set of tools that would be used universally across all projects as the bare minimum and a set of more sophisticated tools that would be applied on projects from risk categories.

This article is a part of a wider research that focuses on the project management on the Czech international development projects. As the next step, an analysis will be conducted on what results are important for each implementing organisation and what project management tools they use and how this influences their results.

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Appendix

Table 5

Budget Variation

			Result: Budget			Budget variance (in CZK)			
Factor	**total**	**share**	**under**	**on**	**above**	**min**	**max**	**mean**	**med**
Implementing agency	**369**		**136**	**212**	**21**				
NGO	111	30%	23%	76%	2%	–7,575,320	172,600	–150,475	0
State institution	83	22%	22%	76%	2%	–1,025,541	227,069	–56,693	0
International	3	1%	33%	33%	33%	–295,620	5,844	–96,592	0
Private company	167	45%	53%	38%	10%	–17,299,081	3,787,899	–611,085	–258
Combination	5	1%	80%	20%	0%	–8,499,091	0	–2,292,119	–896,100
Financing	**369**		**136**	**212**	**21**				
Grant	111	30%	6%	93%	1%	–7,575,320	172,600	–98,800	0
Budgetary measure	31	8%	0%	94%	6%	0	227,069	7,513	0
Public procurement	227	62%	57%	35%	8%	–17,299,081	3,787,899	–548,352	–6,383
Project size	**369**		**136**	**212**	**21**				
Till 1m CZK	145	39%	46%	45%	9%	–1,000,000	19,758	–71,167	0
1m CZK – 4m CZK	112	30%	29%	66%	5%	–2,741,655	365,061	–138,604	0
Above 4m CZK	112	30%	33%	65%	2%	–17,299,081	3,787,899	–976,492	0
Sector	**369**		**136**	**212**	**21**				
Energy	29	8%	55%	31%	14%	–8,721,650	3,787,899	–647,023	–20,080
Disasters	6	2%	0%	100%	0%	0	0	0	0
Forestry	4	1%	25%	75%	0%	–300,000	0	–75,000	0
Social care	34	9%	21%	79%	0%	–1,498,594	0	–82,946	0
State administration and civil society	52	14%	17%	73%	10%	–5,302,600	19,758	–143,707	0
Mining	1	0%	0%	100%	0%	0	0	0	0
Water	55	15%	49%	44%	7%	–15,995,000	164,318	–970,431	0
Education	47	13%	30%	68%	2%	–1,663,864	17,165	–81,585	0
Health care	38	10%	61%	39%	0%	–7,800,000	0	–514,634	–9,898
Agriculture	98	27%	39%	54%	7%	–17,299,081	227,069	–294,781	0
Environment	5	1%	20%	80%	0%	–200,500	0	–40,100	0

Aid receiving country	**369**		**136**	**212**	**21**				
Afghanistan	6	2%	0%	100%	0%	0	0	0	0
Bosnia and Herzegovina	78	21%	42%	42%	15%	–8,721,650	3,787,899	–334,855	0
Ethiopia	44	12%	32%	66%	2%	–8,499,091	3,647	–414,951	0
Georgia	76	21%	37%	59%	4%	–7,575,320	19,758	–142,384	0
Cambodia	20	5%	35%	65%	0%	–7,800,000	0	–478,069	0
Kosovo	7	2%	14%	86%	0%	–1,688,000	0	–241,143	0
Moldova	68	18%	38%	59%	3%	–17,299,081	172,600	–901,603	0
Mongolia	14	4%	43%	50%	7%	–1,300,000	161	–135,929	0
Palestine	4	1%	50%	50%	0%	–126,872	0	–38,872	–14,308
Serbia	8	2%	38%	50%	13%	–184,266	3,165	–40,975	0
Ukraine	31	8%	42%	55%	3%	–1,663,864	17,165	–109,258	0
Zambia	13	4%	23%	77%	0%	–1,600,696	0	–129,268	0
Result: budget	**369**		**136**	**212**	**21**				
Under budget	136	37%	–	–	–	–17,299,081	–2	–1,029,516	–192,133
On budget	212	57%	–	–	–	0	0	0	0
Over budget	21	6%	–	–	–	161	3,787,899	228,774	4,005
Result: schedule	**369**		**136**	**212**	**21**				
On schedule	310	84%	35%	59%	6%	–15,995,000	3,787,899	–314,899	0
Overschedule	59	16%	49%	49%	2%	–17,299,081	365,061	–637,138	0

Source: Created by author.

Table 6

Schedule Variation

			Result: Schedule		Schedule variance (in years)			
Factor	**total**	**share**	**on**	**above**	**min**	**max**	**mean**	**med**
Implementing agency	**369**		**310**	**59**				
NGO	111	30%	83%	17%	0.0	2.0	0.2	0.0
State institution	83	22%	80%	20%	0.0	3.0	0.2	0.0
International	3	1%	100%	0%	0.0	0.0	0.0	0.0
Private company	167	45%	87%	13%	0.0	3.0	0.1	0.0
Combination	5	1%	80%	20%	0.0	1.0	0.2	0.0
Financing	**369**		**310**	**59**				
Grant	111	30%	85%	15%	0.0	2.0	0.2	0.0
Budgetary measure	31	8%	77%	23%	0.0	3.0	0.2	0.0
Public procurement	227	62%	85%	15%	0.0	3.0	0.2	0.0
Project size	**369**		**310**	**59**				
Till 1m CZK	145	39%	93%	7%	0.0	1.0	0.1	0.0
1m CZK – 4m CZK	112	30%	83%	17%	0.0	2.0	0.2	0.0
Above 4m CZK	112	30%	73%	27%	0.0	3.0	0.3	0.0
Sector	**369**		**310**	**59**				
Energy	29	8%	72%	28%	0.0	1.0	0.3	0.0
Disasters	6	2%	83%	17%	0.0	1.0	0.2	0.0
Forestry	4	1%	25%	75%	0.0	1.0	0.8	1.0
Social care	34	9%	88%	12%	0.0	1.0	0.1	0.0
State administration and civil society	52	14%	90%	10%	0.0	1.0	0.1	0.0
Mining	1	0%	100%	0%	0.0	0.0	0.0	0.0
Water	55	15%	87%	13%	0.0	2.0	0.1	0.0
Education	47	13%	72%	28%	0.0	2.0	0.3	0.0
Health care	38	10%	89%	11%	0.0	2.0	0.1	0.0
Agriculture	98	27%	88%	12%	0.0	3.0	0.1	0.0
Environment	5	1%	60%	40%	0.0	2.0	0.4	0.0

Aid receiving country	**369**		**310**	**59**				
Afghanistan	6	2%	100%	0%	0.0	0.0	0.0	0.0
Bosnia and Herzegovina	78	21%	85%	15%	0.0	3.0	0.2	0.0
Ethiopia	44	12%	84%	16%	0.0	2.0	0.2	0.0
Georgia	76	21%	88%	12%	0.0	2.0	0.1	0.0
Cambodia	20	5%	85%	15%	0.0	1.0	0.2	0.0
Kosovo	7	2%	86%	14%	0.0	1.0	0.1	0.0
Moldova	68	18%	87%	13%	0.0	3.0	0.1	0.0
Mongolia	14	4%	79%	21%	0.0	2.0	0.2	0.0
Palestine	4	1%	100%	0%	0.0	0.0	0.0	0.0
Serbia	8	2%	88%	13%	0.0	1.0	0.1	0.0
Ukraine	31	8%	68%	32%	0.0	1.0	0.3	0.0
Zambia	13	4%	69%	31%	0.0	1.0	0.3	0.0
Result: budget	**369**		**310**	**59**				
Under budget	136	37%	79%	21%	0.0	3.0	0.2	0.0
On budget	212	57%	86%	14%	0.0	3.0	0.1	0.0
Over budget	21	6%	95%	5%	0.0	1.0	0.0	0.0
Result: schedule	**369**		**310**	**59**				
On schedule	310	84%	–	–	0.0	0.0	0.0	0.0
Overschedule	59	16%	–	–	1.0	3.0	1.0	1.0

Source: Created by author.

T a b l e 7

Correlation

	Implementing agency	**Financing**	**Sector**	**Project size**	**Aid receiving country**
Implementing agency	1				
Financing	0.7486	1			
Sector	–0.0211	0.0208	1		
Project size	–0.2899	–0.4173	–0.0781	1	
Aid receiving country	–0.0902	–0.4174	0.0053	–0.0449	1

Source: Created by author.