

Capital budgeting methods - The practices of Polish companies listed on the Warsaw Stock Exchange

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Abstract

Purpose of the study: In this study, the authors analyzed of the use of capital budgeting methods (CBM) by Polish companies listed on the Warsaw Stock Exchange (WSE). The study's main objective was to investigate the practice of capital budgeting in companies operating in Poland and listed on the WSE, especially to analyze the dispersion of capital budgeting methods and the factors influencing their selection.

Methodology: For achieve the research objectives, a survey method was chosen. The authors received 34 correctly completed questionnaires (from 252, the return rate was 13.5. Descriptive statistics and multiple regression analysis with the use of *Statistica* were used in the study.

Main Findings: The survey indicated that CBMs are relatively frequently applied in particular; IRR was used (often or always) by 64.7 per cent of companies and NPV by 60.6 per cent of companies. The analysis of company characteristics shows that the use of CBM is influenced by the origin of equity, managerial ownership, employment, and foreign sales (all independent variables are statistically significant).

Applications of the study: The authors believe that the study's results will be of interest to researchers in other countries and will fill a gap in the management accounting literature. The study's results may also be useful from a practical point of view.

Novelty/Originality of the study: The survey shows a large sample of companies, what CBMs are used by Polish companies and how often they are used. A broader set of explanatory variables was also used, which allows for a comprehensive description of campaign practices and makes it possible to analyze whether and which companies' practices are consistent with previous studies.

INTRODUCTION

This study analyses the use of capital budgeting (CBM) methods by Polish companies listed on the Warsaw Stock Exchange. This area is important because capital budgeting decisions are one of a company's most essential financial management areas. Poland was chosen for the study because, although dynamic development has been recorded in recent years, the country is still, in many respects, less developed compared to the developed economies where most of the research has been conducted so far. Although the process of CBM diffusion in developed countries (especially in large companies) is almost complete (e.g. [Graham, Harvey, 2001](#); [Ryan and Ryan, 2002](#); [Hermes et al., 2007](#); [Truong et al., 2008](#)), this is not the case in Poland (e.g. [Zarzecki, 1997](#); [Szychta, 2001](#); [Rogowski, Kasiewicz, 2006](#); [Wnuk-Pel, 2011](#); [Andor et al., 2011](#); [Wnuk-Pel, 2013](#)). the survey focuses on bridging the gap between the theory and practice of capital budgeting in a developing country, allowing us to determine how theoretical concepts are adopted. The survey results will be helpful in theory and practitioners as they will learn more about the practice of capital budgeting in Poland.

The practice of capital budgeting has attracted the attention of researchers worldwide for many years. Still, the vast majority of dedicated research has been carried out in highly developed countries, mainly in North America (Canada ([Graham, Harvey, 2001](#)) and the USA ([Graham, Harvey, 2001](#); [Ryan, Ryan, 2002](#)), Australia ([Truong et al., 2008](#)) and Europe, including France ([Brounen et al., 2004](#)), Germany ([Brounen et al., 2004](#)), the Netherlands ([Hermes, Smid, 2007](#)), Sweden ([Sandahl, Sjögren, 2003](#); [Daunfeldt, Hartwig, 2011](#)), the U.K. ([Brounen et al., 2004](#)). The outcomes of this research are well known, particularly in universities, and have certainly impacted the development of theory and teaching and their practical application. Although to date there have been studies focusing on the diffusion of capital budgeting methods in Poland (e.g. [Zarzecki, 1997](#); [Szychta, 2001](#); [Rogowski, Kasiewicz, 2006](#), [Wnuk-Pel, 2011](#); [Wnuk-Pel, 2013](#)), Their results have been partial and usually focused only on the extent of different diffusion of CBM, without a more detailed analysis.

Regarding the practice of companies in applying CBM in Poland, [Szychta \(2001\)](#) reported that companies primarily used net present value (30%) and internal rate of return (25%). Later analyses confirm these results, e.g., according to Wnuk-Pel ([2011](#)), the prevalence of these methods has increased to 53% (NPV) and 47% (IRR). [Andor et al. \(2011\)](#), on the other hand, determined that the use of the discounted cash flow (DCF) technique occurred in nearly 58% of Polish

companies. Interestingly, as the use of DCF-based methods increases, enterprises also use other methods more often (e.g. payback - P.B. or accounting rate of return - ARR). Szychta (2001) put their prevalence at 40% and 35% of companies. Later studies indicated an increase in their popularity, with Wnuk-Pel (2011) identifying them as 81% and 59%, while Andor et al. (2011) identified them as 61% and 68%, respectively. However, the studies mentioned above mainly focused on the diffusion of capital budgeting methods and did not provide a more detailed analysis of their application.

Although several studies on the diffusion of CBM methods have been conducted in Poland, the use of these methods is not sufficiently explained, especially compared to studies conducted in more developed countries. The study of capital budgeting practices in companies from Poland seems attractive due to the historical background of the country and its recent development. Poland underwent a political transformation initiated in the late 1980s, which resulted in profound changes in the country's economy; over the years, it has gone a long way from communism to capitalism, and since the late 1990s, Poland has been integrating into the European Union structures (since 2004 Poland has been a member of the European Union). The Polish economy is open to foreign capital, and companies operating in Poland have to compete with foreign companies on the local market and increasingly globally. The competition manifests itself, among other things, in investments undertaken by companies operating in Poland, which, to compete with other companies, need to be increasingly influential - which is conditioned, on the one hand, by business ideas, as well as the proper evaluation of these ideas (investments) - based on methods widely used in enterprises operating in more developed countries (e.g. [Graham, Harvey, 2001](#); [Ryan, Ryan, 2002](#); [Hermes et al., 2007](#); [Truong et al., 2008](#)).

Previous research on capital budgeting conducted in Poland has not sufficiently addressed questions such as (a) are there differences in the use of CBM between companies with different characteristics? (b) are there differences in the use of methods between companies with varying characteristics of CFO? and (c) is the use of CBM influenced by the size of the investment budget?

The above questions became the basis for defining the purpose of the study - to examine the use of capital budgeting practices in enterprises located in Poland and listed on the Warsaw Stock Exchange, in particular, to analyze the dispersion of capital budgeting methods among companies and the factors influencing their choice. The objective of the study is broadly in line with the objectives of similar studies conducted worldwide (e.g. [Warfield et al., 1995](#); [Pike, 1996](#); [Klassen, 1997](#); [Arnold, Hatzopoulos, 2000](#); [Graham, Harvey, 2001](#); [Anand, 2002](#); [Sandahl, Sjögren, 2003](#); [Brounen et al., 2004](#); [Verbeeten, 2006](#); [Hermes, Smid, 2007](#); [Leon et al., 2008](#); [Truong et al., 2008](#); [Holmen, Pramborg, 2009](#); [Verma et al., 2009](#); [Bennouna et al., 2010](#); [Andor et al., 2011](#); [Daunfeldt, Hartwig, 2011](#); [Hartwig, 2012](#); [Ahmed, 2013](#)), but some aspects were slightly different. This study examines not only the use of capital budgeting methods (as all previous studies in this country have done), but also the factors determining their choice. In this respect, the study is unique.

The remainder of the article is organized as follows: first, the assumptions on which the developed theoretical model is based will be presented. Then the results of the study will be presented in terms of the capital budgeting methods used and the factors determining their application. The article concludes with conclusions.

METHODOLOGY

The survey method was chosen. Despite the many shortcomings of research carried out through surveys (compared to the case study method, which allows for a more detailed analysis of actual practices used in companies), the authors are confident that it will enable the analysis of the practice of enterprises in Poland in terms of the determinants of capital budgeting and provide a basis for the modification of existing assumptions in the use of methods and the factors that determine their implementation. The use of a survey was also dictated by the possibility of comparing the results with other researchers (e.g. [Warfield et al., 1995](#); [Pike, 1996](#); [Klassen, 1997](#); [Arnold, Hatzopoulos, 2000](#); [Graham, Harvey, 2001](#); [Anand, 2002](#); [Sandahl, Sjögren, 2003](#); [Brounen et al., 2004](#); [Verbeeten, 2006](#); [Hermes, Smid, 2007](#); [Leon et al., 2008](#); [Truong et al., 2008](#); [Holmen, Pramborg, 2009](#); [Verma et al., 2009](#); [Bennouna et al., 2010](#); [Andor et al., 2011](#); [Daunfeldt, Hartwig, 2011](#); [Hartwig, 2012](#); [Ahmed, 2013](#)). As a broad and rich review of capital budgeting practice has never been done in Poland (to the authors' knowledge), the study is therefore unique.

To analyze the diffusion of capital budgeting methods and the factors influencing their choice in companies listed on the Warsaw Stock Exchange. Respondents were asked three groups of questions:

1. Company characteristics (11 questions),
2. Characteristics of the financial director (3 questions),
3. Application of investment valuation methods (5 questions).

The questionnaire contained single-choice and multiple-choice questions, but respondents were asked to provide extended answers and comments. Some of the questions used a 5-point Likert scale, where the answer 'never' has a value of '1', 'rarely' has a value of '2', 'occasionally' has a value of '3', 'often' has a value of '4' and 'always' has a value of '5'. Only companies that answered 'often' or 'always' are classified as users of the method.

The questionnaire was distributed to companies listed on the Warsaw Stock Exchange. A total of 252 questionnaires were sent out in Poland. The authors received 34 correctly completed questionnaires, so the response rate was 13.5% overall. The practice of capital budgeting encompasses several methods that managers can choose to facilitate decision-making. These methods include investment valuation methods such as NPV, IRR, etc., and risk assessment methods

such as sensitivity or scenario analysis. Different classifications have been used in past studies ([Arnold, Hatzopoulos, 2000](#); [Graham, Harvey, 2001](#); [Anand, 2002](#); [Ryan, Ryan, 2002](#); [Sandahl, Sjögren, 2003](#); [Brounen et al., 2004](#); [Liljeblom, Vaihekoski, 2004](#); [Danielson, Scott 2006](#); [Verbeeten, 2006](#); [Hermes, Smid, 2007](#); [Leon et al., 2008](#); [Truong et al., 2008](#); [Bennouna et al., 2010](#); [Andor et al., 2011](#); [Daunfeldt, Hartwig, 2011](#); [Ahmed, 2013](#)). The present study did not use the detailed classification from previous studies and focused on examining the investment valuation and risk analysis methods that have been used in most studies to date (the purpose of concentrating on variables commonly used in previous studies was to obtain a detailed comparison of results).

This study also investigated which methods of estimating the cost of capital for DCF techniques are used in Poland. Although not all of the studies as mentioned above address this issue, the authors wanted to analyze them in more detail, as this research area is underdeveloped and to ensure comparability of results with studies conducted in different countries, e.g. [Arnold, Hatzopoulos \(2000\)](#), [Anand \(2002\)](#), [Ryan, Ryan \(2002\)](#), [Brounen et al. \(2004\)](#), [Liljeblom, Vaihekoski \(2004\)](#), [Block \(2005\)](#), [Verbeeten \(2006\)](#), [Hermes et al. \(2007\)](#), [Leon et al. \(2008\)](#), [Truong et al. \(2008\)](#) and [Bennouna et al. \(2010\)](#).

Table 1: Capital budgeting methods (CBM) analyzed

Capital budgeting methods (CBM)	Symbol	Capital budgeting methods (CBM)	Symbol
The investment valuation method used:		The discount rate used in DCF methods:	
Net Present Value (NPV)	APR_NPV	The weighted average cost of capital (WACC)	COST_WACC
– Internal Rate of Return (IRR)	APR_IRR	Risk assessment methods:	
– Payback Period (P.B.)	APR_PB	– sensitivity analysis	A_SENSITIVITY
– Discounted Payback Period (DPB)	APR_DPB	– scenario analysis	A_SCENARIO
– Accounting Rate of Return (ARR)	APR_ARR		

Source: Own elaboration

The capital budgeting methods identified in Table 1 will act as dependent variables. Whether (how often) they are used and what (independent variables) influence their use will be examined. The analysis is based on the multiple regression method as presented in equation 1 (this is a modified version of the equation used by [Daunfeldt and Hartwig, 2011](#)).

$$CBM_{ij} = \alpha_0 + \alpha_1 MAN_i + \alpha_2 FOWN_i + \alpha_3 MANOWN_i + \alpha_4 LSIZE_i + \alpha_5 FSALES_i + \alpha_6 HLEV_i + \alpha_7 DIV_i + \alpha_8 YOUNG_i + \alpha_9 HEDU_i + \alpha_{10} STEN_i + \alpha_{11} LCAPEX_i + \epsilon_i$$

(Equation 1)

where:

- CBM_{ij} - capital budgeting method used j (j = 1, 2...8) by firm i (i = 1, 2...n);
- MAN_i - a type of activity carried out by firm i (i = 1, 2...n) (if a manufacturing firm - MAN, if a non-manufacturing firm - NMAN);
- FOWN_i - the origin of capital i (i = 1, 2...n) defined as the percentage of foreign ownership (if foreign ownership - FOWN, if there is no foreign ownership - NFOWN);
- MANOWN_i - shareholding of firm i (i = 1, 2...n) held by the top three managers ranging from less than 5% to more than 20% (if less than 5% owned by the top three managers - NMANOWN, if more than 5% owned by the top three managers - MANOWN);
- LSIZE_i - size of company i (i = 1, 2...n) defined by the number of employees in the range from less than 10 to more than 1000 employees (if a company has less than 250 employees, it is defined as SMALL, if a company has more than 250 employees, it is defined as LARGE);
- FSALES_i - proportion of the firm's foreign sales i (i = 1, 2...n) ranging from 0% to more than 50% (if foreign sales are up to 25% the firm is defined as having no foreign sales - NFSALES, if foreign sales exceed 25% the firm is defined as having foreign sales - FSALES);
- HLEV_i - ratio of total debt to assets of firm i (i = 1, 2...n) ranging from 10% to more than 50% (if leverage is up to 25%, the firm is defined as having low leverage - LLEV, if leverage is more than 25%, the firm is defined as having high leverage - HLEV);
- DIV_i - dividend policy of company i (i = 1, 2...n) (if the company pays dividends - DIV, if the company does not pay dividends - NDIV);
- YOUNG_i - age of the CFO of company i (i = 1, 2...n) ranging from less than 40 years to more than 60 years (for less than 50 years the CFO is defined as YOUNG, for more than 50 years the CFO is defined as OLD);

- HEDUi - education of the CFO of company i (i = 1, 2...n) in business/economics ranging from less than a bachelor's degree to more than a postgraduate degree (if the CFO had a master's degree or higher in business/economics he/she is defined as highly educated - HEDU, otherwise he/she is defined as uneducated - NHEDU);
- STENi - number of years the CFO has been a CFO in the company and (i = 1, 2...n) ranges from less than 4 years to more than 9 years (if the CFO has been in the position for less than nine years he/she is defined as short-term - STEN, if the CFO in the position for more than 9 years he/she is defined as long-term - LTEN);
- LCAPEXi - size of the capital expenditure budget of company i (i = 1, 2...n) ranging from less than €0.1 million to more than €50 million (if the capital expenditure budget is up to €1 million it is defined as small - SCAPEX, if the capital expenditure budget exceeds €1 million it is defined as large - LCAPEX).

RESULTS

The analysis covered 34 companies listed on the Warsaw Stock Exchange, classified by the industry as manufacturing (35.3%) and services (64.7%). The financial resources of the Polish companies were sourced domestically and internationally (73.5% and 26.5%), with the top three managers of the companies usually owning (51.9%) less than 5% of the company's equity. Over half (53%) of Polish companies had been established for more than 20 years and were large in size, with more than 250 employees (67.7%), an annual turnover of more than €50m (35.1%) and total assets of more than €43m (36.4%). Detailed information is presented in Table 2.

Table 2: Companies' demographics

	Number	%		Number	%
Type of main operation:			Share of total sales abroad:		
non-manufacturing	22	64.7%	0%	20	60.6%
manufacturing	12	35.3%	1-25%	8	24.2%
Origin of capital:			25-50%	3	9.1%
100% domestic	25	73.5%	> 50%	2	6.1%
share of foreign	9	26.5%			
Equity owned by the company's three top managers:			Leverage (total debt to asset ratio):		
less than 5%	14	51.9%	less than 10%	7	26.0%
5-10%	2	7.4%	10-25%	8	29.6%
11-20%	0	0%	25-50%	6	22.2%
more than 20%	11	40.7%	> 50%	6	22.2%
Employees:			Dividend payment:		
< 10	0	0%	not paying	12	38.7%
11-50	3	8.8%	paying	19	61.3 %
51-250	8	23.5%			
251-1000	14	41.2%			
> 1000	9	26.5%			

Source: Own elaboration.

The analysis provided a closer look at the profile of the CFO - most CFOs were aged 40-50 (41.2% of respondents) and 51-60 (35.3%). They most often had a business/economics degree at the master's level (75.8%) or higher (15.1%). The length of tenure was similar: for 35.3% of respondents, it was less than four years; for 38.2%, it was between four and nine years; and for 26.5%, it was more than nine years. The questionnaire also verified the size of the capital expenditure budget - for almost half of the companies, it was in the range of €100,000 to €1 million. Detailed information is presented in Table 3.

Table 3: Characteristics of the finance director and capital expenditure

	Number	%
CFO's age:		
< 40 years	8	23.5%
40-50 years	14	41.2%
51-60 years	12	35.3%
> 60 years	0	0%
CFO's academic degree in business/economics:		
less than bachelor	2	6.1%
bachelor	1	3.0%
master's degree	25	75.8%
higher than post-graduate (e.g. PhD)	5	15.1%
CFO has been sitting on the Board in Company:		
less than 4 years	12	35.3%
4-9 years	13	38.2%

more than 9 years	9	26.5%
The annual capital budget in Your Company:		
< 0,1 million €	3	8.8%
0,1-1 million €	16	47.1%
1-10 million €	8	23.5%
10-50 million €	3	8.8%
> 50 million €	4	11.8%

Source: Own elaboration

The study examined the capital budgeting methods used by companies. Respondents were asked whether and how often they use such capital budgeting methods when making investment decisions. The results are presented in Table 4. The score indicating the frequency of use of each method ranges from 1 to 5, where a score of 1 means that the CFO 'never' used such a method, a score of 2 meant 'rarely', a score of 3 meant 'occasionally', a score of 4 was often, and 5 was always.

Table 4: Frequency of application of selected capital budgeting methods

	Frequency of use				
	never	rarely	occasionally	often	always
APR_NPV	N 4	3	5	10	11
	% 12.1	9.1	15.2	30.3	33.3
APR_IRR	N 4	2	6	10	12
	% 11.8	5.9	17.6	29.4	35.3
APR_PB	N 4	3	6	9	10
	% 12.5	9.4	18.8	28.1	31.2
APR_DPB	N 8	6	6	7	5
	% 25.0	18.8	18.8	21.9	15.5
APR_ARR	N 9	6	8	4	2
	% 31.0	20.7	27.6	13.8	6.9
COST_WACC	N 7	3	3	5	11
	% 24.1	10.4	10.4	17.2	37.9
A_SENSITIVITY	N 5	3	6	11	3
	% 17.9	10.7	21.4	39.3	10.7
A_SCENARIO	N 6	3	6	11	7
	% 18.2	9.1	18.2	33.3	21.2

Source: Own elaboration

The results presented in Table 4 show the main facts about the capital budgeting methods used by Polish companies these are:

- The most popular methods of investment evaluation are the internal rate of return, the present value of the investment and the payback period: IRR is used by 64.7% of the companies surveyed, NPV and P.B. by 60.6% and 59.3% respectively,
- The use of the discounted payback period and the accounting rate of return is much lower, moreover, a high percentage of companies were found that do not use these tools: 25% and 31%,
- A large group of companies use the weighted average cost of capital to calculate discounted flows; WACC is used by 37.9% of Polish, but a relatively large group was also found not to have implemented this tool: 24.1%,
- Risk assessment methods are used by relatively half of the surveyed entities: scenario analysis was used by 54.5% and sensitivity analysis by 50%.

Table 5: Determinants of the choice of capital budgeting method

	R ²	Adj. R ²	Std. Error of the Estimate	Constant	MAN	FOWN	MAN-OWN	LSIZE	FSALES	HLEV	DIV	YOUNG	HEDV	STEN	LCA-PEX
APR_NPV	.952	.887	.424	2.673	.060	.195	-.304	.403	.234	.136	.066	-.562	-.139	-.055	-.020
Significant				.000	.644	.082	.032	.037	.108	.161	.599	.002	.367	.614	.859
APR_IRR	.811	.550	.899	3.139	-.181	.211	-.237	.433	-.354	.210	.006	-.396	-.263	-.291	-.148
Significant				.008	.490	.313	.343	.217	.207	.266	.977	.143	.392	.200	.528
APR_PB	.860	.605	.739	1.940	.324	.276	.416	.603	-.698	-.207	.251	.440	-.052	-.842	-.653
Significant				.099	.274	.202	.143	.082	.041	.305	.382	.107	.834	.013	.028

APR_DPB	.791	.409	.995	3.176	.503	.305	.459	.843	-.640	.029	-.084	.072	-.542	-.852	-.590
Significant				.055	.178	.243	.180	.055	.100	.900	.805	.808	.115	.028	.079
APR_ARR	.861	.478	.950	3.452	.267	.505	.979	1.308	-.137	.075	-.381	.215	-1.013	-.368	-1.144
Significant				.062	.661	.111	.167	.149	.753	.782	.335	.497	.093	.339	.072
COST_WACC	.880	.552	1.116	1.075	.631	.318	-.053	1.088	-.036	.162	.100	-.667	-.340	.379	-.736
Significant				.512	.363	.218	.921	.251	.917	.503	.754	.080	.518	.326	.234
A_SENSITIVITY	.998	.993	.117	2.646	.048	.345	-.290	-.120	-.106	-.083	-.025	-.907	.168	.017	.041
Significant				.000	.300	.001	.003	.086	.058	.064	.536	.000	.027	.596	.367
A_SCENARIO	.792	.506	1.153	1.356	-.343	.337	-.256	-.010	.414	-.170	-.113	-.310	.374	-.113	.084
Significant				.279	.228	.140	.330	.975	.165	.384	.666	.291	.254	.617	.730

Source: Own elaboration

The data analysis (see Table 5) shows how well the choice of capital budgeting method is predicted by company characteristics, CFO characteristics and the size of the investment budget.

In terms of the features describing the enterprise, it was not observed that any of the features determined most of the analyzed methods while maintaining statistical significance. The observed statistically significant relationships ($p < 0.05$) are:

- Origin of equity capital - sensitivity analysis,
- Percentage of managerial ownership - NPV and sensitivity analysis,
- Size (measured by the number of employees) - NPV,
- Foreign sales - P.B.

No statistically significant relationships were observed for the following variables: type of business, high financial leverage and dividend payment.

In terms of CFO characteristics, the performance of Polish companies suggests that:

- CFO education - sensitivity analysis,
- CFO age - NPV and sensitivity analysis,
- CFO tenure - P.B. and DPB.

The size of the capital expenditure budget appeared to affect the use of capital budgeting methods, although the relationship is significant only for the use of P.B.

Table 5 also shows the percentage of variation in capital budgeting methods that can be explained by company characteristics, CFO characteristics and the size of the capital expenditure budget. The developed model explains the variability of the dependent variables satisfactorily; the best fit could be observed for sensitivity analysis and NPV. The use of sensitivity analysis is 99.3% explained by the model and NPV is 88.7% explained. When explaining sensitivity analysis, four of the independent variables analyzed are statistically significant - the origin of equity (0.345), ownership of managers (-0.290) and also age and seniority of the CFO (-0.907 and 0.168, respectively)). When explaining NPV, three of the independent variables are significant - ownership of managers (-0.304), employment (0.403) and age of the CFO (-0.562)).

DISCUSSION

The results obtained for CBM diffusion are similar to previous studies in Poland ([Szychta, 2001](#); [Wnuk-Pel, 2011](#); [Andor et al., 2011](#); [Wnuk-Pel, 2013](#)). This also means that the diffusion of capital budgeting methods in Poland is lower than in more developed countries ([Graham, Harvey, 2001](#); [Ryan, Ryan, 2002](#); [Sandahl, Sjögren, 2003](#); [Brounen et al., 2004](#); [Hermes, Smid, 2007](#); [Truong et al., 2008](#); [Daunfeldt, Hartwig, 2011](#)).

In line with previous studies ([Pike, 1996](#); [Payne et al., 1999](#); [Graham, Harvey, 2001](#); [Sandahl, Sjögren, 2003](#); [Brounen et al., 2004](#); [Verbeeten, 2006](#); [Hermes et al., 2007](#); [Bennouna et al., 2010](#); [Andor et al., 2011](#); [Daunfeldt, Hartwig, 2011](#); [Correia, 2012](#); [Hartwig, 2012](#); [Ahmed, 2013](#)), size is an important determinant of the use of NPV. Regarding other company characteristics, foreign sales affect the use of capital budgeting methods (P.B.), this confirms the results of a previous study ([Hermes et al., 2007](#); [Holmen, Pramborg, 2009](#); [Daunfeldt, Hartwig, 2011](#)). Also, managerial ownership influences the choice of CBMs (NPV and sensitivity analysis), similar to previous research ([Graham, Harvey, 2001](#); [Anand, 2002](#); [Brounen et al., 2004](#)). In terms of CFO characteristics, the performance of Polish companies suggests in line with previous studies (e.g. [Anand, 2002](#); [Hermes et al., 2007](#); [Leon et al., 2008](#); [Ahmed, 2013](#)) that high CFO education has an impact on most CBM methods, although the relationships are not statistically significant (except for sensitivity analysis). For the other CFO characteristics (young age and length of tenure), the relationships are statistically significant only for NPV and sensitivity analysis (age) and P.B. and DPB (length of tenure). The size of the capital expenditure budget ([Hermes et al., 2007](#); [Verma et al., 2009](#); [Correia, 2012](#)) it seems that this influenced the use of capital budgeting methods, although this relationship is significant only in the case of using P.B.

CONCLUSION

This study has examined the determinants of the use of capital budgeting methods and the diffusion of these methods. Concerning the distribution of CBM, the research indicates that they are relatively frequently applied in companies listed on the WSE. In particular, IRR was used (often or always) by 64.7 per cent of companies, while NPV was used (often or always) by 60.6 per cent of companies; the results for the other methods are similar.

The analysis of company characteristics shows that the use of CBM is influenced by the origin of equity, managerial ownership, employment and foreign sales (all independent variables are statistically significant). The study also shows a statistically significant impact on using capital budgeting methods of CFO characteristics: age, length of service and education. The size of the investment budget also has a statistically significant effect on using CBM.

The survey's contribution to previous research is threefold. Firstly, the study shows, on a large sample of companies, which CBMs are used by Polish companies and how often they are used, to the authors' knowledge such a comprehensive study has not been conducted. Secondly, a broader set of explanatory variables was used, including company characteristics, CFO characteristics and the size of the investment budget, allowing for a comprehensive description of campaign practices and enabling analysis of whether and which company practices are consistent with previous research. Thirdly, the study allows for a comparison of capital budgeting practices with those in other countries. The authors believe that the study's results will also be of interest to researchers in different countries and will fill a gap in the management accounting literature.

The results of the study may also be useful from a practical point of view. In particular, they may help practitioners to identify areas in their companies where the practice of capital budgeting is far from academic recommendations and where the implementation of methods, both theoretically grounded and applied in the practice of companies in more developed countries, could be beneficial to their companies in that they could facilitate value-creating activities. Wider diffusion of CBM could improve the efficiency of investment decisions and have a positive impact on firm performance.

LIMITATION AND STUDY FORWARD

The survey is limited in several respects. First, the survey only measures the reported (perceived) use of capital budgeting methods (not necessarily actions, but rather beliefs) - it is uncertain whether and how these methods are used. Secondly, as the sample was not representative of all Polish companies, the results should be interpreted cautiously. Thirdly, there is the possibility of non-response bias in the results obtained; the response rates are low so the results may show the responses of those more familiar with capital budgeting methods. Finally, it should be noted that surveys generally do not allow an in-depth analysis of capital budgeting practice in the way that is possible using case study research. A comparison of the course of Polish companies utilising the case study method would allow a more detailed analysis of the CBM used and an examination of the investment selection, valuation, implementation and control process. This could be the next step in the research. However, with these limitations in mind, the study allows for a broad examination of CBM applied in Polish companies, an analysis of the factors determining their application and a comparison with similar studies conducted in other countries.

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CONFLICT OF INTEREST

No conflict of interest between the authors.

CO-AUTHORS CONTRIBUTION:

Żaneta Kielanowicz's contribution was as follows: conception, analysis and interpretation.

Tomasz Wnuk-Pel's contribution was as follows: conception and acquisition of data.

Joanna Piłacik's contribution was as follows: analysis and interpretation.

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