Inzinerine Ekonomika-Engineering Economics, **2023, 34(2), 158–174**

Assessment of IT Tools Used for Operational Budgeting in Polish and Lithuanian Companies

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https://doi.org/10.5755/j01.ee.34.2.30480

The paper aims to determine the quality of information and the quality of IT tools used for operational budgeting in Polish and Lithuanian companies. The questionnaires were distributed by e-mail and traditionally among controllers/management accountants. Due to the fact that the sample was non-random, the findings of the research cannot be statistically referred to all the companies. The authors opted for this method of data collection because of the difficulty with survey returnability (extremely low return rate due to the use of sensitive data). However, the authors have taken a number of steps to increase the reliability of the study conducted. The research was preceded by extensive literature studies, the respondents had knowledge of the analyzed phenomenon and the results of the conducted research were compared to the results received by other authors. IT tools supporting operational budgeting with the highest quality assessment were Excel/Access and a ready and parameterized budgeting modules in the Integrated Systems. The analysis shows that low-quality IT systems result in low information quality. The system that is flexible can be modified easily, thus meeting changed user information needs quickly and efficiently, which leads to relevant and up-to-date information outputs to users, implying high information quality. The research shows that the maintenance of high quality of the operational budgeting system is a determinant of the quality of information generated by this system, in its absence - there is no way to ensure the quality of information in the decision-making process. This study allows to interpret the results of prior studies and create directions for future research that will refer to system quality and information quality, but also to a more extensive analysis. The results allow for prioritization in the context of dissemination, but most of all for the evaluation of individual tools supporting operational budgeting. Consequently, it extends the scope of information regarding the choice or change of the tool used, and provides the basis for a deeper analysis of the assessment of the distinguished features characterizing a given tool. The study offers the possibility of continuing it, which would allow comparison of the results, both in other countries, as well as repeating the study in the future and the possibility of observing changes in the tools used and assessing their quality. The survey could serve as a prelude to in-depth qualitative research, which would enable analysis of the factors determining the quality of the system used and the information generated.

Keywords: *Management Accounting Information; Information Quality; Excel; ERP.*

Introduction

Operational budgeting is one of the most important instruments of management accounting (Merchant *et al.*, 2003, Blumentritt 2006, Okoye, 2011, Nita, 2011; Siska, 2016; Groen *et al.*, 2017; Wagner *et al.*, 2020; Dokulil *et al.*, 2020; Dokulil *et al.*, 2022). According to Szychta (2008, p. 408), budgeting "is related to a number of issues and aspects of management accounting. It is related to cost accounting systems, reliability accounting, performance measurement as well as incentives and remuneration system in an enterprise." In the broadest approach, it can be analyzed in terms of its diffusion degree and use in companies - operational budgeting is one of the most frequently used and researched tools of management accounting (Radek & Schwarz, 2000; Ekholm & Wallin, 2000; Sobanska & Wnuk-Pel, 2000; Szychta 2001; Joshi, 2001; Merchant *et al.*, 2003; Foremna-Pilarska, 2004; Drury, 2005; Hyvonen, 2005; Cyganska, 2007; Angelakis *et al.*, 2010; Hilton & Platt, 2013; Davila *et al.*, 2018; Wnuk-Pel & Christauskas, 2018; Dokulil *et al.*, 2020; Pietrzak, 2020). Kenno *et al.* (2018), for example, recently provided a literature review

on almost 250 articles on budgeting indicating that research in this area remains popular and relevant.

Operational budgeting can also be analyzed in terms of a variety of functions that can be implemented in business management (Szychta, 2008). Budgeting remains one of the primary control tools for most entities worldwide (research was conducted in medium and large companies) (Anthony *et al.*, 2007). The implementation of an operational budgeting system is not dependent on such factors as the type of business, size of the enterprise and country of origin (Libby & Lindsay, 2010; Ostergren & Stensaker, 2011; Uyar & Bilgin, 2011; Derfuss, 2016; Siska, 2016; Klimaitiene & Ramanauskaite, 2019; Dokulil *et al.*, 2022). Budgeting makes it possible to carry out management functions such as coordinating, motivating, controlling and also evaluating the effectiveness of the activities and employees performed (Angelakis *et al.*, 2010; Farouk & McLellan, 2011; Yalcin, 2012; Shcherbina & Tamuleviciene, 2016; Becker *et al.*, 2016; Goretzki & Messner, 2016; Palermo, 2018; Henttu-Aho, 2018; Arnold & Artz, 2019; Pietrzak, 2020). In summary, budgeting, through its importance in the process of business management, is becoming a particularly significant field of scientific research (Arnold & Gillenkirch, 2015; Becker *et al.*, 2016; Arnold & Artz, 2019; Henri *et al.*, 2020), companies do deal with the emerging problems of budgeting and benefit from the numerous reasons to budget.

Literature studies (Wnuk-Pel, Christauskas, 2018; Klimaitiene & Ramanauskaite, 2019; Wagner *et al.*, 2020; Dokulil *et al.*, 2020; Dokulil *et al.*, 2022) done so far in Poland, Lithuania but also in other countries all over the world and author's experiences as consultants show that IT tools used to support budgeting mainly include quite simple software: a) Excel, Access, b) IT software specially written for the company, c) special budgeting software ready and parameterized for the company, d) ready and parameterized budgeting module in the Enterprise Resources Planning (ERP) systems and this is the reason why authors focused on them in the paper. The other reason that the research concentrated on the most popular simple IT tools is that more than 75 % of the surveyed entities were small or medium-sized enterprises.

Information treated as a product of operational budgeting, generated by the used IT tool, is an important element influencing the assessment of budgeting quality. Most basic research into information quality comes from research into information systems. Researchers identified a set of features and dimensions for information quality assessment (Ramayah & Omar, 2010; Turyna, 2012; Mirarchi & Pavan, 2019; Marinagi *et al.*, 2019; Tarigan & Basana, 2019)

The paper aims to examine quality of information and the quality of IT tools used for operational budgeting in Polish and Lithuanian companies. However, we did not find studies in the literature on this topic that analyzed the surveyed entities by using the same instrument, assuming homogeneity of the sample from both countries. In an effort to fill the identified research gap, we attempted to conduct the analysis using the same research instrument (survey questionnaire) to compare samples from both countries while maintaining the same number of surveyed units and comparable structure (company size, type of activity and share of foreign equity). The authors conducted a survey based on standardized questionnaires to characterize operational budgeting systems, measure the quality of IT systems used and the quality of information it delivers (quantitative research). The sample of the surveyed enterprises consisted of 50 entities from Lithuania and 50 enterprises from Poland. The size and structure of the samples (expressed by selected variables) from both countries are exactly the same. In other words, it can be said that for each Lithuanian enterprise a Polish unit with the same characteristics has been found.

The most popular tools used for operational budgeting were the simplest tools – spreadsheets or databases (Excel, Access etc.). These tools were also rated the highest, which is mainly the result of its highest rating in terms of three features: easy to use, little cost spent, and little time spent – the highest scores in relation to other IT tools. Additionally, it should be emphasized that in the assessment of tools supporting operational budgeting, no significant differences were found between the analyzed countries.

When interpreting the results, however, one should bear in mind that the limitations of the conducted study are connected to respondents (participants of trainings, courses and post-graduate studies in the field of management accounting) and method of selecting the research sample (selection of enterprises with the same characteristics from both surveyed countries). As a result, it is uncertain whether the findings can be applied in broader terms.

The study completes the research gap in the context of a broad and comprehensive review of the quality of operational budgeting that has not yet been carried out in Polish and Lithuanian companies. On the other hand, it allows the interpretation of its results in the context of research conducted in other countries (Centage/IOMA, 2007; Williams, 2008; Orlando, 2009; Gorla *et al.*, 2010; Ifinedo *et al.*, 2010; Spraakman, 2015; Dokulil *et al.*, 2020). Among the most important results of the study are the development of proprietary indicators for determining the quality of the IT system and the information generated, as well as the conclusions drawn from the analysis: the widespread use and high rating of spreadsheets used for operational budgeting (Teo & Lee-Partridge, 2001; Centage/IOMA, 2007; Williams, 2008; Hesse, Hesse Scerno, 2009; Orlando, 2009) compared to the other tools studied. High quality in spreadsheets is especially crucial since inferior data quality induces costly, sub-optimal decision making (Galetta *et al.*, 1996; Lueg, 2010; Spraakman, 2015; Dokulil *et al.*, 2020). However, it should be noted that Orlando (2009) and Player (2007) got the opposite opinion and a very critical evaluation of spreadsheets. The authors also conducted a comparison of the evaluation of the budgeting system in two countries, Poland and Lithuania, but no significant differences were noted.

The first part of the paper presents a short theoretical introduction in terms of methods of defining the quality of the IT system and the quality of information based on a literature review. Next, the results of conducted research are presented. The study ends with a short summary of results, discussion and conclusions.

Literature Review

The topic of IT software use for operational budgeting has been addressed by several authors (Reiff, 2001;

Rasmussenn *et al.,* 2003; Giannetto, 2006; Williams, 2008; Player, 2009; Chapman & Kihn 2009; Coulmas & Law, 2010; Elbashir *et al.,* 2011; Ghasemi *et al.*, 2011; Taipaleenmaki & Ikäheimo 2013; Corte-Real *et al.,* 2017; Wnuk-Pel & Christauskas, 2018; Keimer & Egle 2018; Schafer & Weber 2018; Bergman *et al.*, 2020). Despite many attempts, it has not been possible to develop a uniform and consistent measure to determine the quality of the information system used in the budgeting process. Instead, researchers have attempted to describe quality through sets of characteristics that the system should have. Researchers have repeatedly stressed that the system should not be based on MS Excel (Reiff, 2001; Giannetto, 2006; Williams, 2008; Player, 2009; Coulmas & Law, 2010), but this does not translate into enterprise practice - most companies (85 % of small/medium enterprises) still use spreadsheets as the primary tool in the budgeting process (Centage/IOMA, 2007; Williams, 2008; Dokulil & Popesco, 2020; Dokulil *et al.*, 2022).

The tool, according to the researchers, should be based on a central database, containing both historical and current data, and should allow the entity to share and continuously update information on planned data as well as compare it with current performance, in relative real time (Giannetto, 2006). The System should allow for scenario (what-if) analysis (Player, 2009) as well as enable enterprise resource planning (ERP) and/or general ledger (GL) applications in the entity (Williams, 2008). Implementing software that meets the criteria described should generate a number of benefits: Player (2009) finds that organizations with integrated systems spend significantly less time on the budgeting process. The use of integrated software allows managers to assess the performance of budgets on an ongoing basis, which can translate into faster identification of problems and possible responses (Giannetto, 2006; Grover *et al.*, 2018). The use of scenario analysis allows the organization to prepare for new challenges and, if necessary, correct current decisions (Williams, 2008; Player, 2009).

The use of more sophisticated and advanced tools organizes the budgeting process, which becomes less susceptible to manipulation and thus the possibility of distortions (Giannetto, 2006) Other researchers (Reiff, 2001; Williams, 2008; Coulmas, Law, 2010) add that the use of integrated solutions allows for deep data analysis, preparation of more adequate reports for current decisions as well as much faster feedback and thus the possibility of reaction (shortening of the cycle time).Reiff (2001) also emphasizes the importance of greater employee participation in the budgeting process, as well as the positive effects of the use of new budgeting technologies (CIMA / ICAEW, 2004).

It should be noted, however, that the study also shows the negative aspects of technological changes in budgeting: a) increasing the degree of centralization, b) changes in the structure of the organization with a focus on the vertical hierarchical structure, c) changing the company's culture too quickly, which may translate into resistance and reluctance of employees (CIMA /ICAEW, 2004), d) high capital outlays, which may become a barrier, especially for small and medium-sized entities (Williams, 2008; Player, 2009) - nevertheless, it should be remembered that the list and level of sophistication as well as the costs of the offered systems are very varied (Reiff, 2001). In this context, it is interesting whether enterprises rate more advanced tools much higher, or whether the rating of simpler ones (Excel/Access) will be relatively lower and their use is determined primarily by the cost factor.

The quality of IT system is closely related to the quality of generated information - there is no accounting information quality without quality accounting information system (Susanto, 2015; Bachmid, 2016; Abdelraheem *et al.*, 2021). The issue of data quality is an aspect of particular importance for the accounting information system, both in terms of financial reporting and for the performance of management functions, therefore the necessity to provide qualitative information becomes a basic factor for users and decision makers (Xu, 2015; Nurhidayati *et al.*, 2017; Hassanh *et al.*, 2018; Abdelraheem *et al.*, 2021). In the process of making management decisions, information that meets certain qualitative characteristics (attributes that should characterize them) is necessary. The subject of information quality assessment for management purposes is widely described in the literature on the subject. A list of selected publications with qualitative characteristics is presented in Table 1.

Table 1

Qualitative Characteristics of Information

Author	Year	Information attributes
Jiabalvo	2010	Relevant, predictive, up-to-date, available, profitable
Rabren	2010	Speed, quality of data
Ramayah & Omar	2010	Timeliness, accuracy, completeness, adequacy, credibility
O'Brien & Marakas	2010	Time, content, format
Stair & Reynolds	2010	Accessible, accurate, complete, economical, flexible, relevant, reliable, secure, simple, timely, verifiable
Dull *et al.*	2012	Timeliness, accuracy, completeness
Porter & Norton	2012	Relevant, timeliness, complete, neutral, error free
Turyna	2012	Accuracy, form, frequency, relevance, scope, original, unique, up-to-date, time horizon, completeness, up-to-date
Romney & Steinbart	2012	Accurate, up-to-date, complete, relevant
Zadeh *et al.*	2017	Completeness, accuracy, non-redundancy, well-formedness, understandability
Shamala *et al.*	2017	Accuracy, amount of data, availability, believability, completeness, relevancy, reliability, timeliness, understandability
Mirarchi & Pavan	2019	Accuracy, consistency, completeness
Marinagi *et al.*	2019	Believability, interpretability, value-add, reputation, completeness, objectiveness, reliability, timeliness and response time, price, accuracy, availability, latency, response time
Tarigan & Basana	2019	Data accuracy, completeness, objectiveness, reliability, timeliness, relevancy data
Binh *et al.*	2020	Accuracy, completeness, consistency, timeliness
Abdelraheem *et al.*	2021	Relevance, reliability, consistency, understandability, comparability

The most frequently mentioned characteristics of management information include: relevance, objectivity, usability, timeliness, usefulness, completeness, comprehensibility, up-to-date, comparability (Ramayah & Omar, 2010; Turyna, 2012; Dull *et al.*, 2012, Romney, Steinbart, 2012; Shamala *et al.*, 2017; Mirarchi & Pavan, 2019; Marinagi *et al.*, 2019; Tarigan & Basana, 2019; Binh *et al.*, 2020; Abdelraheem *et al.*, 2021). Dimensions of accounting information quality are determined (Abdelraheem *et al.*, 2021) by:

- Relevance: ability to provide sufficient and appropriate information to make appropriate decisions so that this information is recognized as suitable for decision-making and presented correctly as well as its availability promptly.
- Reliability: ability to rely on it – free from error and bias.
- Consistency: achieved when an organization uses a fixed accounting treatment from one period to the next without change.
- Understandability: helps the user of accounting information in determining the significance of the contents and presentation of financial reports.
- Comparability: allows users of financial reports to compare accounting information between different periods to make their decisions.

In the light of the above the purpose of the research was to examine quality of information and the quality of IT tools used for operational budgeting. Groen *et al.* (2017) suggest that doing research on budgeting systems in various countries, or specific industries, broadens the empirical foundation and understanding of the conditions of the implementation of budgets. Therefore, the analysis will be carried out in two countries – Poland and Lithuania. The choice of Lithuania and Poland is determined by a similar past of these countries. For more than 50 years they were part of the communist bloc and only after its overthrow could an accounting system suitable for companies operating in market economy, come to life. The conducted analysis is aimed at verifying whether this change is similar, or whether there has been a greater differentiation in the solutions developed over the last 30 years. To fulfil this purpose we tried to answer three research questions:

1) How do enterprises evaluate the quality of the IT systems used for budgeting?
2) How do enterprises evaluate the quality of the information generated?
3) Does the type of the IT tool determine the quality of the information?

Answers to such questions will also be verified in terms of significant differences in assessment, taking into account the country in which the enterprise operates (Poland - Lithuania), are there any significant differences in the assessment of Polish and Lithuanian enterprises? As we focus on detailed observation of the factors influencing the quality of information and quality of IT systems, our research was mainly descriptive.

Methodology

In order to achieve the objectives of the study, the method of survey research was use as it will facilitate unique comparisons of company's practice in Poland and Lithuania in terms of quality of information generated by the operational budgeting system in the context of the use of various types of information (IT) systems. According to our knowledge as broad and comprehensive overview of information quality of operational budgeting has never been made in Polish and Lithuanian companies before. The study is therefore unique.

To analyze operational budgeting and information quality in Polish and Lithuanian companies the respondents were asked 5 groups of questions (questionnaire is presented in Appendix 1):

a) respondents characteristics (5 questions),
b) companies characteristics (5 questions),
c) operational budgeting system characteristics (7 questions),
d) operational budgeting IT system characteristics (3 questions),
e) qualitative characteristics of information generated by operational budgeting IT system (1 question).

The survey was based on single-choice questions. In questions defining the respondent's influence and participation, as well as evaluation of the quality of information (3.3 - 3.6, 4.3, 5.1) a 7 grade Likert scale was used. The questionnaire was initially tested by the authors on a group of colleagues from their faculties, and after taking into account minor corrections, another attempt was made to verify it on a small group of practitioners in both countries, on this basis minor corrections and improvements were made. We decided to distribute the questionnaire by e-mail and traditionally (in the paper form) among controllers/ management accountants and managers participating in postgraduate studies and courses in the area of controlling/management accounting. The selection of this particular group was dictated by the possibility of collecting data (in countries where the research was conducted it's extremely difficult to obtain such comprehensive and sensitive information by distributing the questionnaires for example by e-mail) and the belief that these respondents would have appropriate knowledge of the researched subject. In general 712 questionnaires were distributed in Poland (via the Internet: 212, in person: 500) and 85 in Lithuania (all in person). 280 properly filled questionnaires in Poland and 50 in Lithuania were received after leaving incomplete questionnaires. Thus the response rate was in general 41.40 %. Due to the large disproportion between the number of questionnaires collected in both countries, it was decided to narrow down the sample from Poland to 50 questionnaires. In order to obtain comparability of both groups, the selection was determined by the structure of the Lithuanian sample.

The variables selected as characterizing enterprises (type of activity, share of foreign equity, employment) are based on the literature (Libby & Lindsay, 2010; Ostergren & Stensaker, 2011; Uyar & Bilgin, 2011; Derfuss, 2016; Siska, 2016; Klimaitiene & Ramanauskaite, 2019; Dokulil *et al.*, 2022). These company characteristics are typically used in majority of management accounting studies. In total 100 questionnaires from Poland and Lithuania were used in the study.

The study defined two groups of independent variables: 1) related to the system quality and 2) the quality of the information generated. The first group is: transparency and user-friendliness, ease of use, flexibility as well as time and cost expenditure. The second: (a) easily accessible and

achievable, (b) accurate and precise, (c) credible and reliable, (d) current and "delivered on time" as well as I understandable and affordable for the user.

Due to the fact that the choice of a sample was non-random, the findings of the research cannot be statistically referred to all the companies within the investigated population (companies operating in Poland and Lithuania). During the development and subsequent implementation of the study, the authors made efforts to ensure structural reliability, internal and external reliability, as well as the validity of the study. The study was preceded by extensive literature studies so as to select an appropriate research design and method (structural reliability). For internal reliability, it was checked whether the respondents had knowledge of the phenomenon under analysis, i.e. operational budgeting, while external reliability was ensured by comparing the results obtained with those obtained by other authors. Prior to the implementation of the study, the scheme of procedures and also the methods of documentation (validity of the study) were determined.

Research Results

General Description of the Companies

Due to large disproportion in the number of surveys collected in Poland (280) and Lithuania (50), it was decided to select only some of the questionnaires from Poland. The determining factor was the number and structure of questionnaires from Lithuanian enterprises (50). Enterprises from Lithuania were classified according to the type of activity, the origin of equity and the number of employees. In the next step, mirror image enterprises in terms of the above-mentioned factors were selected from the Polish sample (50). In effect the survey respondents represented 50 companies from Poland (50 % from the sample) and Lithuania (50, 50 %). The selection details of the structure of sample are presented in Figure 1. The size and structure of the samples from both countries are exactly the same.

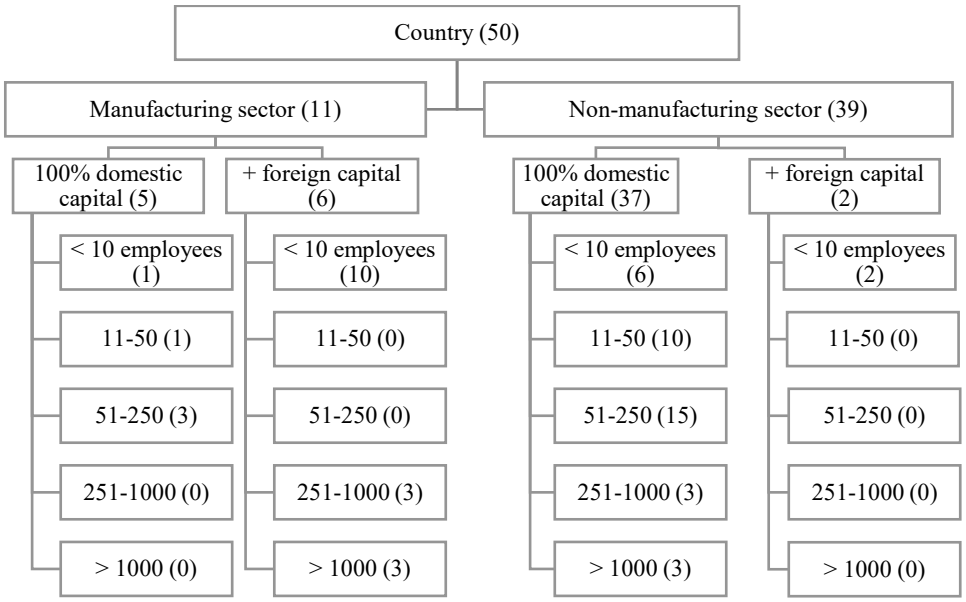

Figure 1. Structure and Size of the Studied Sample (the Same in Poland and Lithuania)

The studied sample was dominated by non-manufacturing companies (78 %). The manufacturing firms made up only 22 % of the sample. Taking into account the origin of equity capital – the vast majority was financed only with domestic capital – 84 %. This is mainly due to the domination of domestic capital in the group of non-manufacturing enterprises – 95 % of the respondents declared that the enterprise is financed solely with domestic capital. In manufacturing enterprises this division was more even – 45 % were financed only with domestic capital, and 55 % have mixed capital, partly domestic and partly foreign.

The number of employees variable used in this research to define the size of the companies – is presented in Table 2.

Table 2

The Number of Employees in the Companies Surveyed

	Specification	n	Cumulative n	%	Cumulative %
Number of employees	< 10 employees	9	9	18	18
	11- 50 employees	11	20	22	40
	51–250 employees	18	38	36	76
	251–1000 employees	6	44	12	88
	More than 1000 employees	6	50	12	100
	Total	50	-	100	-

Taking into account employment, five categories were distinguished. The medium-sized entities (51–250 employees) turned out to be the dominant group (36 %), compared to 22 % small (11–50 employees) and 18 % very small entities (less than 10 employees). The three smallest groups in total constitute 76 % of the studied sample. The remainder (24 %) were large and very large units (their numbers were exactly the same – 12 %). It is worth emphasizing that in the group of production enterprises, smaller companies (up to 250 employees) were financed solely with domestic equity, while larger ones (over 251 employees) had foreign participation. In the surveyed sample of service enterprises, units with only domestic capital prevailed (95 %), whose employment was similar to that in the total sample.

Characteristics of Operational Budgeting Systems used in the Companies

The findings of the survey suggest that the existing operational budgeting systems has been used for a long time. 31 % of the companies implemented it 4 to 10 years earlier, and in 37 % of the companies operational budgeting systems are „older" than 10 years. It means that in as many as 68 % companies operational budgeting has been functioning for more than 3 years. Only in 12 % of the sample companies operational budgeting used were relatively „younger" – they were implemented less than one year ago. It is worth emphasizing that operational budgeting has been functioning longer in Lithuanian enterprises – as many as 78 % enterprises implemented it over 3 years ago, while in the Polish sample this percentage is only 58 %. The share of enterprises that implemented the system in the last year is also significant – in Lithuania it was only 6 %, while in Poland as much as 3 times more – 18 %.

The most common IT tool used for operational budgeting were spreadsheets or databases (Excel, Access etc.), their use was declared by 69 % of respondents, both in Poland (72 %) and Lithuania (66 %). The use of ready-made and parameterized budgeting software for the company was reported by a similar percentage in both countries (11 % on average). The biggest difference was visible for the other two tools listed in the questionnaire. In Lithuania, the use of an IT software specially written for the company and a dedicated budgeting module in the Integrated System (ERP) was relatively similar (10 % and 6 % respectively). In Poland, the use of a dedicated module in the integrated system was much higher (20 %), while the use of an IT software specially written for the company was declared by only 4 % of the respondents. Detailed information on the use of individual tools is presented in the Table 3. The number of employees dealing with the operational budgeting system on an ongoing basis in the surveyed enterprises was varied (Table 4).

Table 3

The IT Tools used for Operational Budgeting

	Total		**Lithuania**		**Poland**	
	n	**cum**	**n**	**%**	**n**	**%**
Excel, Access (T1)	69	69	36	72	33	66
IT software specially written for the company (T2)	7	76	5	10	2	4
special budgeting software ready and parameterized for the company (T3)	11	87	6	12	5	10
ready and parameterized budgeting module in the Integrated System (ERP) (T4)	13	100	3	6	10	20
Total	100	100	50	100	50	100

Table 4

The number of employees operating the budgeting system

	Lithuania	**Poland**	**Total**			
	n	**n**	**n**	**cum n**	**%**	**cum %**
one employee, but this is only part of duties	14	28	42	42	42	42
one employee, but this is main task	6	3	9	51	9	51
two or three employees	20	10	30	81	30	81
four and more employees	10	9	19	100	19	100
Total	50	50	100	100	100	100

Enterprises where the budgeting system was operated by two or three employees (30 %) or more than four (19 %) together accounted for half of the surveyed entities in our sample. On the other hand, in 42 % of the companies surveyed it was only one person for whom these duties were only part of the tasks. This diversity is also visible in individual countries. In Lithuania, more numerous teams (more than 2 people – 60 %) prevailed, while in Poland it was rather part of the duties of one of the employees (56 %).

The surveyed entities used various budgeting methods (often one enterprise declared using more than one method) – Figure 2.

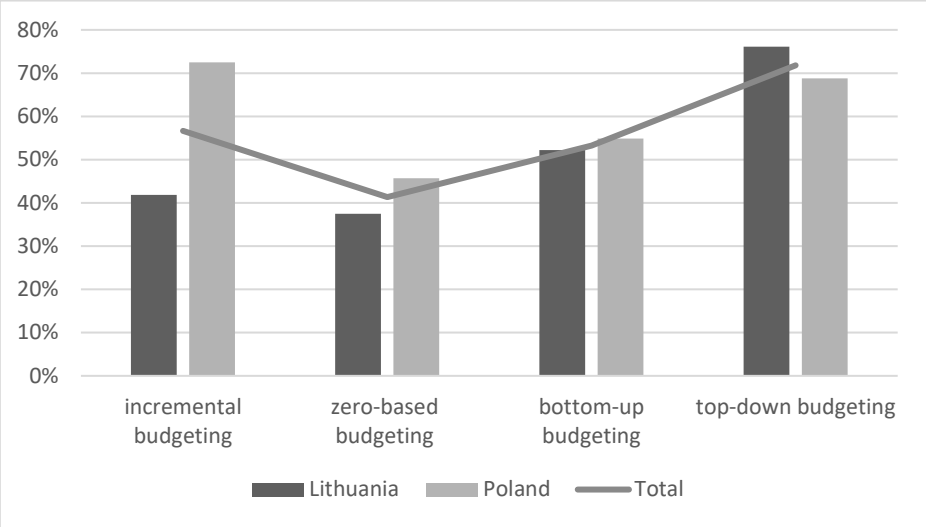

Figure 2. Budgeting Methods used in the Surveyed Enterprises

Top-down budgeting was used most often (76 % of the surveyed enterprises, regardless of the country, declared to use it), it was the most popular method in Lithuania (76 %) and also in Poland (69 %). The least common method used in companies analyzed was zero-based budgeting (in Lithuania – only 38 %, and in Poland – 46 %).

Evaluation of IT System used for Operational Budgeting

The respondents were asked to evaluate the IT systems used in terms of: transparency and user-friendliness, ease of use, flexibility as well as time and cost expenditure (rating on a 7-point Likert scale where 1 means irrelevant and 5 – a very high importance). The survey indicated that the system is not costly (rating 5.33) and that it is easy to use (rating 5.21). The other categories were also rated relatively high – the average was slightly below 5 (flexible: 4.95; transparent and user-friendly: 4.91). The query about time expenditure was ranked the lowest: 4.85. The average rating for all the criteria listed is 5.06. The vast majority of enterprises assessed the system positively: 86 % of respondents indicated a score above 4, of which 46.5 % indicated more than 5. Detailed data on the assessment of individual features, distinguishing between the examined countries, are presented in the Figure 3.

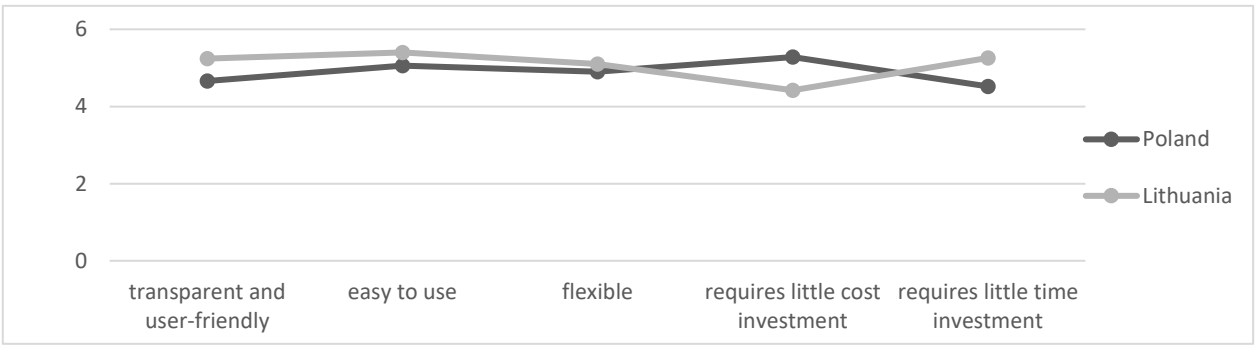

Figure 3. Assessment of the Features of IT Systems in Poland and Lithuania

It is worth emphasizing that respondents from Lithuania rate the IT systems used higher (the average score for all criteria, disregarding costs, is: 5.25), placing higher costs on them (4.42). Polish enterprises invest in their systems with lower cost outlays (5.28), however, they evaluate their quality features lower (4.79). As a result, the average score for Lithuanian enterprises is: 5.28 and for Polish enterprises: 4.84. This difference was confirmed by statistical tests ($t = 2.14$, $p = 0.03$).

The next step of the study was to verify whether the above features are determined by the IT system operating in the enterprise. Taking into account the average grade, Excel was rated the highest (5.23), the following were classified: an IT program specially written for the company (4.93), special budgeting software ready and parameterized for the company (4.6) and a ready and parameterized budgeting module in the Integrated System (ERP) (4.56). A more detailed analysis of the assessment in terms of individual features is presented in the Figure 4.

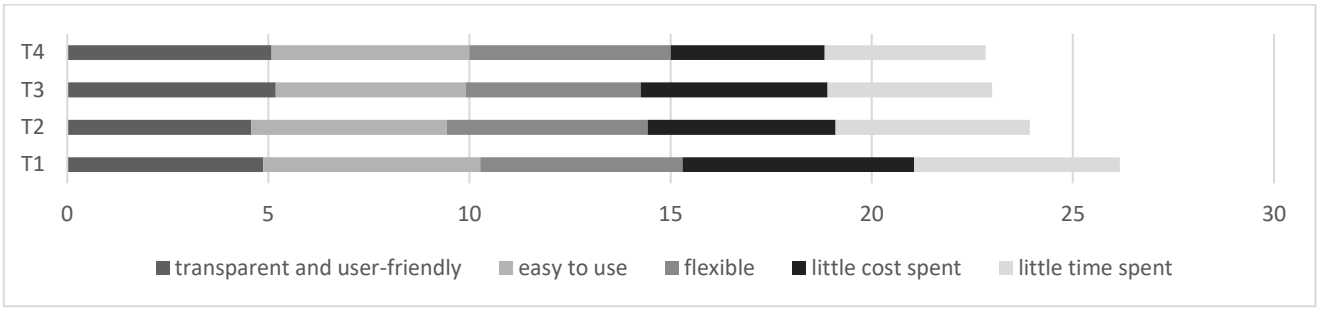

Figure 4. Assessment of Tools in the Enterprise

Based on the data presented in Figure 4 and Table 5, it can be seen that the high rating of operational budgeting carried out with the use of Excel/Access results primarily from its highest rating in terms of 3 features: easy to use (5.4), little cost spent (5.75) and little time spent (5.12) – the highest scores in relation to other IT tools.

Table 5

Assessment of the IT Tools in the Enterprises – Rating

	transparent and user-friendly	easy to use	flexible	little cost spent	little time spent
Excel, Access (T1)	4.87	5.40	5.03	5.75	5.12
IT program specially written for the company (T2)	4.57	4.86	5.00	4.67	4.83
special budgeting software ready and parameterized for the company (T3)	5.18	4.72	4.36	4.64	4.09
ready and parameterized budgeting module in the Integrated System (ERP) (T4)	5.08	4.92	5.00	3.83	4.00
average rating	*4.92*	*5.21*	*4.96*	*5.33*	*4.86*

On the other hand, the lower ratings of the special budgeting software ready and parameterized for the company were influenced by a low score in terms of flexibility (4.36) and time-consumption (4.09), similarly low rating for a ready and parameterized budgeting module in the Integrated System (ERP) was caused by high costs (3.83) and time-consumption (4.00). The t-test for independent samples showed that there is a correlation between the choice of an IT tool and the costs (t=-4.25, p=0.00) and time commitment (t=-2.63, p=0.01), in the case of other features, no statistical significance was found.

Analysis of Information Quality

Analyses of the qualitative characteristics of information (Table 1) identified factors that characterize the information generated in the operational budgeting system: (a) easily accessible and achievable, (b) accurate and precise, (c) credible and reliable, (d) timely and "delivered on time," and (e) understandable and accessible to the user. Respondents determined the extent to which they agreed with a given feature, responses were given using a 7-point Likert scale, where 1 meant 0% compliance, 7–100 % compliance with a given statement. The average ratings of individual features in the surveyed enterprises, broken down by country, are presented in Table 6.

Table 6

Average Scores for Individual Qualitative Features

	Total				Lithuania	Poland
	n	% (rank>4)	Mean	St. dev.	Mean	
easily accessible, achievable	99	51.01	4.33	1.55	4.44	4.22
accurate, precise	100	59.00	4.70	1.27	4.76	4.64
credible, reliable	99	67.68	4.94	1.28	4.92	4.96
current, "delivered on time"	99	63.64	4.94	1.45	5.10	4.78
understandable, affordable for the user	99	60.61	4.77	1.44	4.62	4.92

The respondents gave the highest ratings to the credibility and reliability of information generated in the operational budgeting system, both in Lithuania (4.92) and Poland (4.96). On the 7-point scale, as many as 67.68 % respondents from both countries indicated the score above 4. Currentness and "delivery on time" were ranked next (63.64 % respondents from both countries indicated a score above 4) – a feature especially high appreciated in Lithuania (5.1). In Poland, understandability and affordability of information for the user (4.92) were indicated highest in the ranking. The features which, according to the respondents, were the least characteristic of the operating budgeting system were: easy access and reachability (4.33) – only 51.01 % of all respondents indicated a score above 4.

A reliability analysis was used to test the accuracy of the assessment tool (scale) used. A strong correlation of individual qualitative characteristics was observed (Table 7).

Table 7

Correlations between Qualitative Features of Information in Operational Budgeting

	easily accessible, achievable	easily accessible, achievable	credible, reliable	current, "delivered on time"	understandable, affordable for the user
easily accessible, achievable	1.00	0.56*	0.56*	0.46*	0.56*
accurate, precise		1.00	0.85*	0.50*	0.53*
credible, reliable			1.00	0.52*	0.51*
current, "delivered on time"				1.00	0.63*
understandable, affordable for the user					1.00

** Correlation coefficients are significant (p-value = 0.05; N = 100)*

The scale used to assess the quality of information was reliable - this means that the distinguished items of the scale measure the same object (Cronbach's alpha coefficient: 0.8638, and the average correlation coefficient between scale items 0.5832). Subsequently, an index describing the quality of information in respondent companies was built – as an average of the ratings of individual features (QInfo). Additionally, a factor analysis was carried out in accordance with the confirmatory approach to confirm that the actual data reflect the adopted structure. Only one main factor was identified, strongly correlated with all five features, which together describe 65.6% of the tested feature – information quality. The statistics for the index (QInfo) are presented on Figure 5.

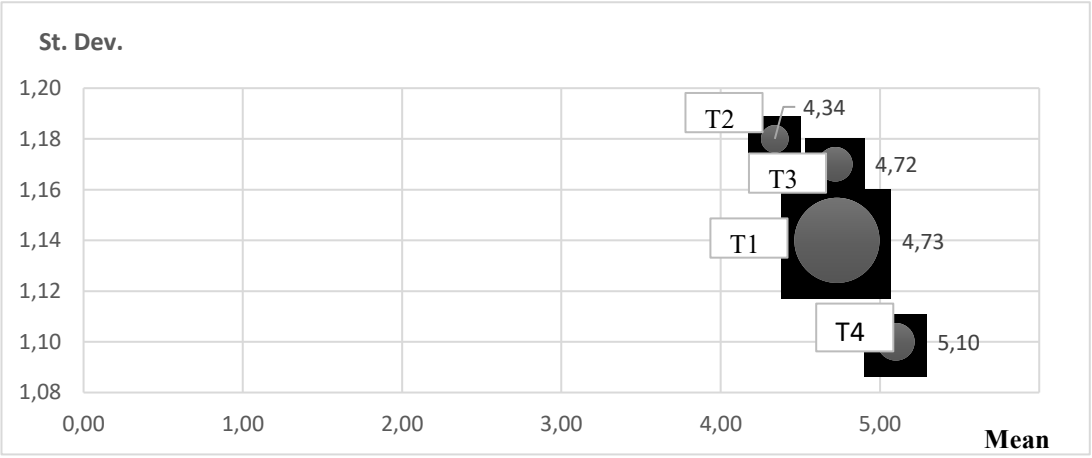

Figure 5. Average Ratings of Information Quality (Q Info) Generated by Individual Tools used for Operational Budgeting

The respondents gave the highest ratings (5.1) to the quality of information generated in a ready and parameterized budgeting module in the Integrated System (ERP) (T4) – as many as 66.67 % of enterprises using this system rated the information generated by it at a level above 5. The evaluation of the next two tools was similar: Excel, Access (T1) – 4.73 and specialist budgeting software ready and parameterized for the company (T3) – 4.72, it should be noted that companies using Excel, Access (T1) were more similar in their assessments. The information generated in the IT program specially written for the company (T2) received the lowest scores (4.34) – only 28.57 % rated the quality of information above 5, and the maximum assessment was below 5.5. Interpreting the results of the study one must remember the different size of groups. The conducted statistical tests did not show statistical significance in the assessment of information generated by individual IT tools.

The quality of information from operating budgeting systems was similarly assessed in both analyzed countries – slightly higher in Lithuania (4.77) compared to Polish enterprises (4.71). However, also in this case no statistically significant differences were observed.

Discussion

The study did not show any significant differences between Poland and Lithuania – the scores obtained in both countries in terms of the quality of information and IT systems were similar. The authors assume that it could have been caused by the selection of the sample – the majority of respondents came from small enterprises (76 % are enterprises with less than 250 employees) and the structure of country's samples were exactly the same and thus the expectations of the company were probably similar.

The most common IT tool used for operational budgeting was spreadsheet or database (Excel, Access etc.), their use was declared by 69 % of respondents, both in Poland (72 %) and Lithuania (66 %). The dissemination of the remaining tools was much more dispersed, therefore the assessment of the generated information may be problematic. Nevertheless, it can be seen that the high rating of operational budgeting carried out with the use of Excel/Access results primarily from its highest rating in terms of 3 features: easy to use (5.4), little cost spent (5.75) and little time spent (5.12) in relation to other IT tools. These results are consistent with research in Poland (Januszewski & Spiewak, 2014) and in the world (Centage/IOMA, 2007; Williams, 2008; Orlando, 2009; Spraakman, 2015; Dokulil *et al.*, 2020). As the research

(Januszewski & Spiewak, 2014) suggests, spreadsheet is still the most popular tool used by controllers/management accountants in Poland. Employers ask about and verify skills in MS Excel during assessment process for newcomers. Orlando (2009) noted that spreadsheets remain the de facto tool for budgeting, used by an average of 81 % of companies either alone or in combination with a general ledger (GL) or enterprise resource planning (ERP) system.

However, the evaluation of the tool is different – in Poland and Lithuania, it was rated high, especially in terms of ease, low cost and time. Orlando (2009) and Player (2007) got the opposite opinion and a very critical evaluation of spreadsheets. The respondents described the use of a spreadsheet as: "*Changes are very difficult in Excel, and it is impossible to drill down into data*." *"[The] process is very manual it's very difficult to budget and manage. Pulling together all the details in summary and detail reporting is cumbersome*." Other complaints included the time-consuming nature of budgeting in spreadsheets, the frequency of errors, difficulties rolling up numbers, and the inability to create "what if" scenarios. Orlando sums up the concerns with an understatement: "*While Excel or other spreadsheet programs are excellent financial tools, they are not necessarily optimized for budgeting*." These differences may result from the size of the analyzed enterprises – in our study, the assessment was made by smaller organizations, which at the moment did not encounter these inconveniences, but perhaps with the increase in activity level, these problems will become visible (Reiff, 2001; Williams, 2008; Coulmas & Law, 2010; Vaznoniene, 2012; Pawlak, 2013).

One of the basic goals of management accounting systems, and thus also operational budgeting, is to transform the collected data into information necessary for users in the decision-making process in order to reduce risk (Susanto, 2015). The accounting information system collects, stores and transforms data precisely in order to produce the necessary information (Romney & Steinbart, 2012). It can therefore be said that the quality of the system may be expressed through the possibility of creating high-quality information (Heidmann *et al*., 2008). This means that the development of information systems is necessary to maintain the required quality of information in an increasingly volatile and demanding environment (Arens, Elder & Mark, 2008).

A system characterized by high quality should provide users with information that will be understandable, and thus their use in the decision-making process will increase the effectiveness of the unit. First of all, it should provide complete and accurate information that, on the one hand, will allow users to perform their daily tasks, and, on the other hand, will be important for making management decisions. The relationship between the quality of the system and the quality of the information provided has been strongly confirmed in the literature on the subject (Li & Lin, 2006; Gorla *et al.*, 2010; Ifinedo *et al.*, 2010).

In this research the authors applied an approach adopted by Gorla *et al.* (2010) who examined the following research questions: "What is the effect of system quality on information quality?" by means of questionnaires which were mailed to 800 randomly selected accounting managers from the Hong Kong Society of Accountants membership list (with 12 % response rate). Their results show that there is a positive significant relationship between system quality and information quality. Thus, this hypothesis was confirmed (it was significant, $\beta = 0.70$, $p < 0.05$). A similar question "*An individual's perceived system quality positively influences the individual's perceived information quality*" was formulated by Xu *et al.* (2013) to 128 respondents in a study. They were recruited from 14 faculties/schools within a state university representing more than 50 different majors. As to the relationships, they found that perceived system quality influenced perceived information quality ($\beta = 0.27$, $p < 0.01$ – hypothesis were confirmed).

These results coincide with the dependencies obtained in the conducted study. Tools with the highest marks in terms of IT system quality assessment – Excel/Access and a ready and parameterized budgeting module in the Integrated System (ERP) were awarded the highest ratings for the quality of the information generated. It should be emphasized that the quality of the information generated by the ERP system was the highest, although the rating of the system itself was lower than that of Excel/Access – this is due to two factors determining the IT system quality (costs and time expenditure, which in the case of the ERP system significantly lowered the overall rating). In recent years, there has been substantial progress in data storage and processing technologies so that managers can now incorporate new opportunities in collecting and handling data into their decision-making (Brynjolfsson & McElheran 2016). Budgeting involves a number of repeating stages of the process, therefore digitization can be relatively quickly integrated with the processes in the company (Warren *et al.* 2015). Moreover, there is a general upward trend in the use of quantitative modeling (Fotr *et al.,* 2015), which enables the generation of more accurate forecasts for operational budgeting.

Conclusion

In summary, only a system with sufficiently high quality is able to provide qualitatively satisfying information, systems that do not meet the requirements will generate irrelevant and inaccurate/incomplete information. The system should be characterized by flexibility and the possibility of modification and adaptation to current needs, thus meeting the information needs of users quickly and efficiently - managers will be able to rely on relevant and timely information (quality information). These assumptions are the foundation for the statement that the high quality of the system (i.e., maintainability, useful features of system, associated with low time and cost) leads to high information content (i.e., useful and relevant information). A system that utilizes user-friendly and well-organized procedures can present information to users in an easy-to-understand format, enabling them to use information systems effectively and making management decisions more appropriate. An integrated system is able to provide complete and accurate information that underpins the daily work of its users, enabling the decision-making process. The degree of sophistication of the system (implementation of modern technologies, integration and user-friendliness) determines the format of the information received (i.e. easy to understand and consistent) and its importance in terms of information content (i.e. complete, accurate, relevant to decision-making).

In summary, only a sufficiently high degree of quality of the accounting information system used makes it possible to generate high quality information (Susanto, 2015). Ponte and Pilar (2000) claim that the quality of accounting information system is a basis for support in creating high-quality information used in the decision-making process.

The study carried out allowed the development of proprietary indicators to determine the quality of the IT system implemented and the quality of the information generated through the system. The authors also conducted a comparison of the evaluation of the budgeting system in the two countries, Poland and Lithuania, but no significant differences were noted. The conclusions of the analysis confirm previous research: the widespread use and high rating of spreadsheets used for operational budgeting compared to other tools studied (Teo, Lee-Partridge, 2001; Centage/IOMA, 2007; Williams, 2008; Hesse, Hesse Scerno, 2009; Orlando, 2009). High quality in spreadsheets is particularly important, as poorer data quality tends to lead to costly, suboptimal decisions (Galetta et al., 1996; Lueg, 2010; Spraakman, 2015; Dokulil *et al.*, 2020). Nevertheless, it should be noted that Orlando (2009) and Player (2007) obtained different results, providing a very critical assessment of spreadsheets.

The following limitations should to be considered before discussing implications for theory and practice. First, this research was conducted on a specific sample taking into account respondents (participants of trainings, courses and post-graduate studies in the field of management accounting) and method of selecting the research sample (selection of Polish enterprises corresponding to the structure of the Lithuanian sample). As a result, it is uncertain whether the findings can be applied in broader terms. Secondly, this research involved only specific factors based on prior research, but did not test the universal set of antecedents for both factors: information quality and IT system quality.

One of the challenges in assessing quality (both information and system) is to find definitions and measures that improve understanding, can be practically implemented, and have the potential to guide management action. In this regard, one of the key contributions of this study is the identification of a comprehensive set of determinants that predict quality of information and assessment of the IT system. This has been largely accomplished by empirical research, but also by reference literature. The authors feel that this study allows to interpret the results of prior studies and create directions for future research that will refer to system quality and information quality, but also to a more extensive analysis of operational budgeting system.

The authors see the possibility to replicate the research in the organizations in another countries both in manufacturing sector and also non-manufacturing organizations. Comparing the results, with the possible new research in other countries or specific industries, it should be borne in mind that the study was conducted mainly on a sample of small and medium-sized enterprises.

From a practical point of view, the results allow for prioritization in the context of dissemination, but above all for the evaluation of individual tools supporting operational budgeting. This allows managers a greater range of information regarding the choice or change of the tool used, and also provides the basis for a deeper analysis in terms of the assessment of the distinguished features characterizing a given tool.

Appendixes

Appendix 1 – Survey questionnaire[1]

1. RESPONDENT CHARACTERISTICS

1.1. Your age:

<30 years	31-40 years	41-50 years	>50 years

1.2. Your academic degree in business / economics:

less than bachelor	bachelor	master's degree	higher than master

1.3. Your role in the company with regard to operational budgeting:
a. mainly generate information in the budgeting system (controller/management accountant or similar position),
b. mainly use information from the budgeting system (manager),
c. no connection with the budgeting process.

1.4. Period of Your professional career (regardless of the place of employment):

1-4 years	5-10 years	10-15 years	>15 years

1.5. Assessment of Your IT knowledge level in relation to the tools used for budgeting in the company:

1 – very low	2	3	4	5	6	7 – very high

2. COMPANY CHARACTERISTICS

2.1. Type of operation:

manufacturing	non-manufacturing

2.2. Origin of capital:

100% domestic	share of foreign

2.3. Employees:

<10	11-50	51-250	251-1.000	>1.000

[1] The questionnaire was developed by one of the authors for her doctoral dissertation (Pietrzak, 2020)

2.4. Annual turnover:

< 2 million €	2-10 million €	11-50 million €	50-200 million €	> 200 million €

2.5. Period of Your Company operation:

<year	1-5 years	5-10 years	>10 years

3. OPERATIONAL BUDGETING SYSTEM CHARACTERISTICS

PERATIONAL BUDGETING - a process involving the design, creation, approval and implementation of the budget, as well as its subsequent control

3.1. Number of employees on a regular basis maintaining operational budgeting system in Your company:
a. one, but this is only part of his duties,
b. one, but this is his/her main task,
c. two or three,
d. four or more.

3.2. Method of operational budgeting used in Your company:

	0 - No	1- Yes
incremental method	0	1
zero-based budgeting	0	1
bottom-up budgeting	0	1
top-down budgeting	0	1

3.3. Budgets in Your company are:

1 - very easy to achieve	2	3	4	5	6	7 - very difficult to achieve

3.4. Your participation in the operational budgeting process is:

1 – very low	2	3	4	5	6	7 – very high

3.5. Your influence on the shape of operational budgeting system (how the budgets and reports are designed) is:

1 – very low	2	3	4	5	6	7 – very high

3.6. In your opinion, problems in the functioning of the operational budgeting system are:

1 – very rare	2	3	4	5	6	7 – very common

3.7. Does Your company plan to change the operational budgeting system in the near future?
a. no, we are not planning changes,
b. yes, we are planning to extend and adjust the operational budgeting system,
c. yes, we are going to abandon the operational budgeting system.

4. OPERATIONAL BUDGETING IT SYSTEM CHARACTERISTICS

IT operational budgeting system (computer model of operational budgeting) - an IT tool that allows the user to input and process, using the predetermined procedures and models, information allowing the operational budget to be prepared and controlled by means of different types of reports and variances)

4.1. Operational budgeting IT system is functioning in Your company:

<year	1-3 years	4-10 years	>10 years

4.2. The computer (IT) model of operational budgeting in Your company operates in:
a. spreadsheet or database (EXCEL, ACCESS, etc.),
b. specially written computer program dedicated for the means of the company,
c. ready and parameterized for the company specialized software for budgeting,
d. ready and parameterized for the company budgeting module in the Integrated System (ERP).

4.3. To what extent do You agree with the statement that IT system of operational budgeting in Your company is:

	1- no	2	3	4 – in 50%	5	6	7 – in 100%
transparent and user-friendly?	1	2	3	4	5	6	7
easy to use?	1	2	3	4	5	6	7
flexible?	1	2	3	4	5	6	7
requires a small cost investment?	1	2	3	4	5	6	7
requires a small time investment?	1	2	3	4	5	6	7

5. QUALITATIVE CHARACTERISTICS OF INFORMATION GENERATED BY OPERATIONAL BUDGETING IT SYSTEM

5.1. To what extent do You agree with the statement that information generated by operational budgeting IT system in Your company are:

	1- no	2	3	4 – in 50%	5	6	7 – in 100%
easily accessible and achievable?	1	2	3	4	5	6	7
accurate and precise?	1	2	3	4	5	6	7
credible and reliable?	1	2	3	4	5	6	7
current and "delivered on time"?	1	2	3	4	5	6	7
understandable and affordable for the user?	1	2	3	4	5	6	7

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The article has been reviewed.

Received in January 2022; accepted in February 2023.