e-mentor

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Can digital transformation be measured from a strategic perspective? Some evidence based on content analysis in the banking and clothing industries

Abstract

Digital transformation is widely recognized to be a key issue in contemporary management studies. The area is attracting increasing attention because of both the general trend of the growing importance which digital technologies play in the present society, as well as the ways companies are using digital technologies to improve their competitive advantage. As a result, digital transformation is a subject of a growing number of papers, research, and managerial publications. The main aim of this work is to propose and validate a method to measure the phenomenon and its role in companies' strategies, and to gather information on strategic directions for digital transformation in enterprises. This paper presents an overview of the literature discussion on digital transformation. A method to study directions of digital transformation in enterprises is demonstrated. It is based on the content analysis methodology and is used to study a choice-based sample of companies listed on the Warsaw Stock Exchange. The research carried out offers preliminary evidence supporting the conclusion that digital transformation is a phenomenon which can be measured with the content analysis framework. The findings also outline strategic directions for digital transformation and shed light on possible variables influencing the process.

Keywords: digital transformation, strategy, digitization, digital technologies, content analysis

Introduction

Digital transformation is a relatively new concept that describes the process of changes in economic and social activities induced by the increasing use of digital technologies. The subject is met with the growing interest of the public and the scientific community. The first aspect is illustrated by the growing popularity of the search for "digital transformation" in the Google search engine. Over the last 7 years, interest in this term has grown rapidly. Details are presented in Figure 1.

A similar effect can be observed in academic interests. The problem of digital transformation is a vibrant research area in sociology (Enjolras & Steen-Johnsen, 2017; Fukuyama, 2018; Graham & Dutton, 2019; Hanna, 2016; Miller, 2020; Webster, 2014), economics (Barefoot et al., 2018; Bukht & Heeks, 2017; Popkova & Sergi, 2019; Schweer & Sahl, 2017; Tapscott, 2015), and management (as discussed more broadly in the paper). The last decade saw a significant increase in the number of scientific publications that deal with the issue of digital transformation of enterprises. According to the data in the Google Scholar database, fewer than 200 articles were published in 2010 and 2011 each on problems related to this topic. In the next years, this number grew slowly until 2015. Since then, the growth has been geometric. In 2019 alone, the number of published scientific texts related to the phrase "digital transformation" + enterprise exceeded 11,000. Details are presented in Figure 2.

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Figure 1
Trend of popularity of the phrase "digital transformation" in Google search engine in the years 2010–2019
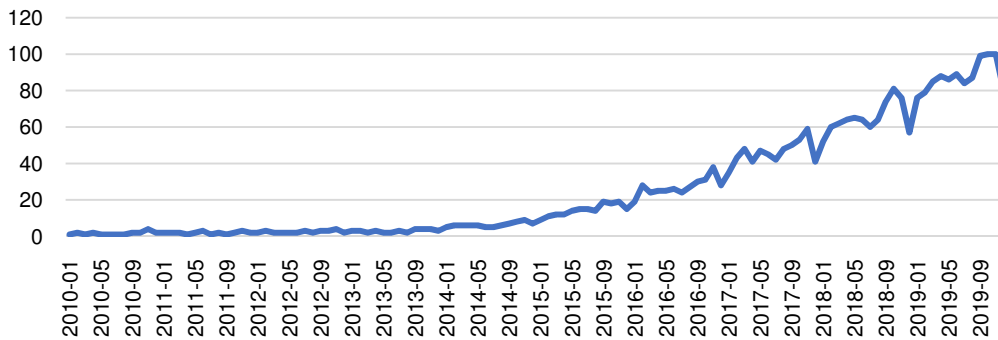
Source: author's work based on data on the query of "digital transformation" from Google Trends service.

Figure 2
Annual number of scientific publications on digital transformation of enterprises in 2010–19
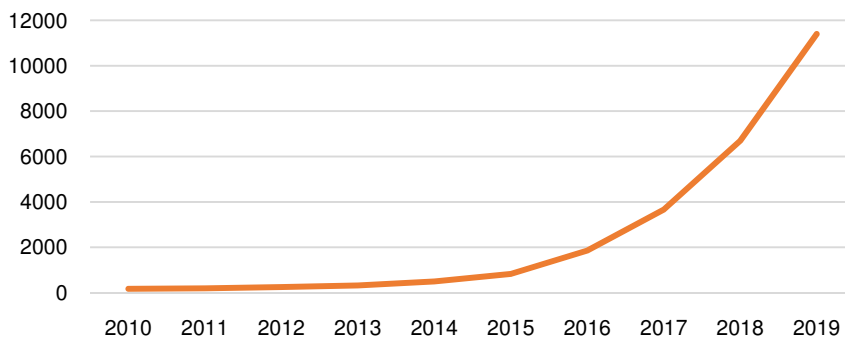
Source: author's work based on the results of searches on query of "digital transformation" + enterprise in Google Scholar.

The vitality of the subject can also be observed in the scope of the topics covered and the variety of opinions on many aspects of digital transformation of enterprises. Although in recent years there have been many attempts to synthesize research and theoretical considerations on the phenomenon (Haffke et al., 2017; Hanelt et al., 2020; Henriette et al., 2015; Karimi & Walter, 2015; Kossowski et al., 2020; Morakanyane et al., 2017; Pihir et al., 2019; Reis et al., 2018; Sebastian et al., 2017; Vial, 2019; Ziyadin et al., 2020), currently there is no general consent about the framework of the concept. The gap is especially evident in empirical studies with a strategic scope of analysis. Difficulties in measuring digital transformation may be an important obstacle hindering research and theory formulation.

This paper addresses this problem by seeking and proposing answers to the following research questions: (a) Can digital transformation be measured? (b) What are the strategic directions for digital transformation in enterprises? (c) Does the size of enterprises and their sectors differentiate the level of strategic commitment to digital transformation? The structure of the paper reflects the above points.

The first part consists of a literature review, the second explains the methodological approach adopted in the research; and the last presents and discusses the results.

The paper's contribution is threefold: (a) it proposes a method which can be used to measure the digital transformation phenomenon at a strategic level; (b) it provides preliminary evidence on the method's research legitimacy; and (c) it outlines strategic directions for digital transformation of the enterprises and sheds light on possible variables influencing the process.

Digital transformation – literature overview

Westerman et al. (2014) describe digital transformation simply as the use of technology to radically improve the efficiency and scope of an enterprise. For Matt et al. (2015), it is a transformation of key business operations, which affects products and processes, as well as organizational structures and management concepts. Legner et al. (2017) present a much narrower take – they identify digital trans-

formation as a use of information technologies to at least partially automate tasks. Kossowski et al. (2020), in turn, defines the process in more general terms – as a transformation of an organization in the era of digitization. It is common for researchers to propose their own definitions. In addition, in recent years several attempts to propose a synthetic definition of the digital transformation of enterprises based on a systematic review of the literature were published (Hanelt et al., 2020; Henriette et al., 2015; Li, 2018; Morakanyane et al., 2017; Pihir et al., 2019; Reis et al., 2018; Vial, 2019; Ziyadin et al., 2020). So far, there is no widely accepted definition of the term.

For most scholars, digital transformation is inextricably linked to new technologies and their use by enterprises. The popular concept of SMACIT associates the phenomenon with five key technologies: Social media, Mobile phones, data Analytics, Cloud computing, and Internet of Things (Sebastian et al., 2017). The Digital Transformation Scoreboard prepared for the European Commission lists nine technologies: social media, smartphones, cloud technologies, Internet of things, cybersecurity, robotics and machine automation, big data and data analytics, 3D printing, and artificial intelligence (Probst et al., 2018). Other researchers, such as Ustundag et al. (2018), supplement those lists with industrial technologies (i.e., intelligent sensors, actuators, RFID[1], RTLS[2], additive manufacturing).

Despite minor discrepancies in scholars' perceptions of the roles of individual technologies, the importance of the technological sphere in digital transformation is undisputed. Technologies enable different aspects of the digitization of previously physical tasks, which in turn brings benefits in many different areas of activity.

Most empirical studies show the impact of digital transformation in a fragmentary way. For example, in the context of internationalization, digital technologies change the determinants of competitive advantages, reduce transaction costs, reduce the importance of the specificity of location and resources, and affect the spread of outsourcing and offshoring (Wittkop et al., 2018). Digitization in startups has a positive effect on the professionalization of organizations (Murmann et al., 2020). According to Piccinini et al. (2015), the use of technology provides benefits primarily in the areas of improving customer experience. The use of digital technologies and the focus on developing new digital solutions cause profound changes in the approach to innovation management (Nambisan et al., 2017). Increased data availability and advances in data analytics are driving changes

by optimizing processes and services (Günther et al., 2017).

A distinct subset of studies focuses on the concept of Industry 4.0, which can be treated as a manifestation of digital transformation in manufacturing organizations. The essence of Industry 4.0 is to build Internet-connected solutions into industrial operations based on microsensors and artificial intelligence algorithms (Carvalho & Cazarini, 2020). Depending on the interpretation, a side effect or a measure used in implementing the ideas of Industry 4.0 is the emergence of cyber-physical systems (Singh, 2020; Zhou et al., 2016), i.e., those in which the flow of physical objects is accompanied by an in-depth and wide registration of digitally stored and processed information.

Based on these fragmentary studies, it can be argued that the term "digital transformation" in its primary meaning denotes a trend of converting originally physical processes into digital equivalents. This view does not call for any strategic approach to successfully manage digital transformation. It is a main discussion point for many authors (An, 2018; Hess et al., 2016; Kane et al., 2015; Rogers, 2016; Vial, 2019; Westerman et al., 2014), who posit that digital transformation is a strategic problem.

According to Rogers (2016), strategy is a key element that is essential in the digital transformation process. New technologies do not shape changes by themselves, and their adoption requires an appropriate strategy. As shown in numerous studies (Gobble, 2018; Ross et al., 2017), many organizations have developed digitization strategies to address the issue. Therefore, digital transformation can be viewed as a new area of strategic management (Loebbecke & Picot, 2015).

On the other hand, Sebastian et al. (2017) perceive digital transformation as a factor changing the rules of the game in sectors, i.e. creating opportunities and threats for existing enterprises. (Iansiti & Lakhani, 2015) show how technologies help to defend market positions against new entrants in the sector through better use of resources and partnerships with technology companies. According to Bell and Berman (2011), the essence of digital transformation is the shift in companies' value propositions toward digital services and products enriched with digital components. These examples show that the literature connecting digital transformation with strategic problems is also very diverse and concerns different levels of enterprises' activity. Rare attempts to describe the strategic directions of digital transformation take the shape of maturity models (An, 2018; Berghaus & Back, 2016; Gill & VanBoskirk, 2016;

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[1] RFID = Radio-frequency identification
[2] RTLS = Real-time locating system

Kane et al., 2015; Rossmann, 2018; Teichert, 2019). However, while this perspective is very attractive for management practitioners, it is based on relatively little empirical data. Thus, the issue of a method which could help to gather evidence on digital transformation from a strategic perspective can be perceived as an important research problem.

Research objectives and method

The objectives of the study are twofold: (a) to propose and validate a method to measure digital transformation at a strategic level of consideration; (b) to gather information on strategic directions for digital transformation in the sample group. Both goals are closely related. The method can only be validated on the gathered information, and vice versa gathering the information requires designing a new method of research.

The new method is based on the content analysis methodology, which is adopted to standardize and interpret information available in annual reports of the sample companies. This approach brings to the fore methodological issues which need to be discussed.

Annual reports as a source of information about companies' strategy

Annual reports published by listed companies are a commonly used source of information on the activities undertaken by enterprises. In particular, standard practice is to use financial information for corporate evaluation. The advantage of this approach is the fact that financial data is highly standardized information. Stock exchanges and financial supervision institutions impose detailed financial reporting guidelines on listed companies.

Corporate reporting standardization guidelines also apply to non-financial information, although to an extent which varies for different management problems. For example, annual reports are often used to research capital group structures, levels of business diversification, and the level of internationalization. The study of these issues do not arouse major methodological discussions due to legal regulations that impose the need to publish information about capital ties, and the industrial and geographical scope of business activities.

Apart from the above, the annual reports published by companies listed on the Warsaw Stock Exchange also contain a lot of information imposed by less stringent regulations. They include, among others: information about development strategy plans and their implementation, and an overview of risk factors and threats, specifying the degree of exposure (Pachucki & Plutecki, 2018). In addition, larger listed companies are required to publish a description of the business model, key non-financial performance indicators and CSR policies (Pachucki & Plutecki, 2018). The above information, although standardized to a small extent, can also be a source of data on corporate strategies. The lack of standardiza-

tion of strategic information poses a challenge, which requires a more sophisticated research approach. In this respect, it is necessary to standardize the available information before its analysis.

Content analysis as a method to standardize information from annual reports

An effective way to study non-standardized information is to use the content analysis method as described by Saldaña (2014). The use of this approach in the social sciences has a very long history (Berelson, 1952) and can be associated with both qualitative and quantitative research (Krippendorff, 2004). In the field of management sciences, the first examples of its application can be traced back as early as to the 1970s. At that time, studies of the content of annual reports were carried out, in which this technique was used to analyze corporate strategies (Bowman, 1978, 1984). Nowadays, this approach is often used in the context of new management concepts (Amini et al., 2018; Garanina & Dumay, 2017; Guthrie et al., 2004; Santema et al., 2005).

In this method, the solution to the problem of insufficient standardization of input data is solved by a coding procedure (Krippendorff, 2004). This involves assigning descriptive terms to excerpts of source material. They can and often take the form of hierarchical categories, so the source text is represented in a structure that can be further analyzed (Saldaña, 2014).

A two-step coding procedure is used, especially in studies which analyze the extensive resources of input texts. In the first step, a dictionary of key words and phrases is created. The entries are used to search for excerpts of source materials related to the variables defined by the researchers. The terms are arranged into summary categories. In the processes of analysis, appropriate excerpts are marked with terms and categories. They are objects of further study depending on the research objectives.

In qualitative research, an in-depth interpretation of the contexts in which categories appear is performed. In quantitative research, it is possible to study the frequency of occurrence of individual categories and entries. Both approaches can be combined. A simplified diagram of the research procedure for the quantitative analysis of the content is presented in Figure 3.

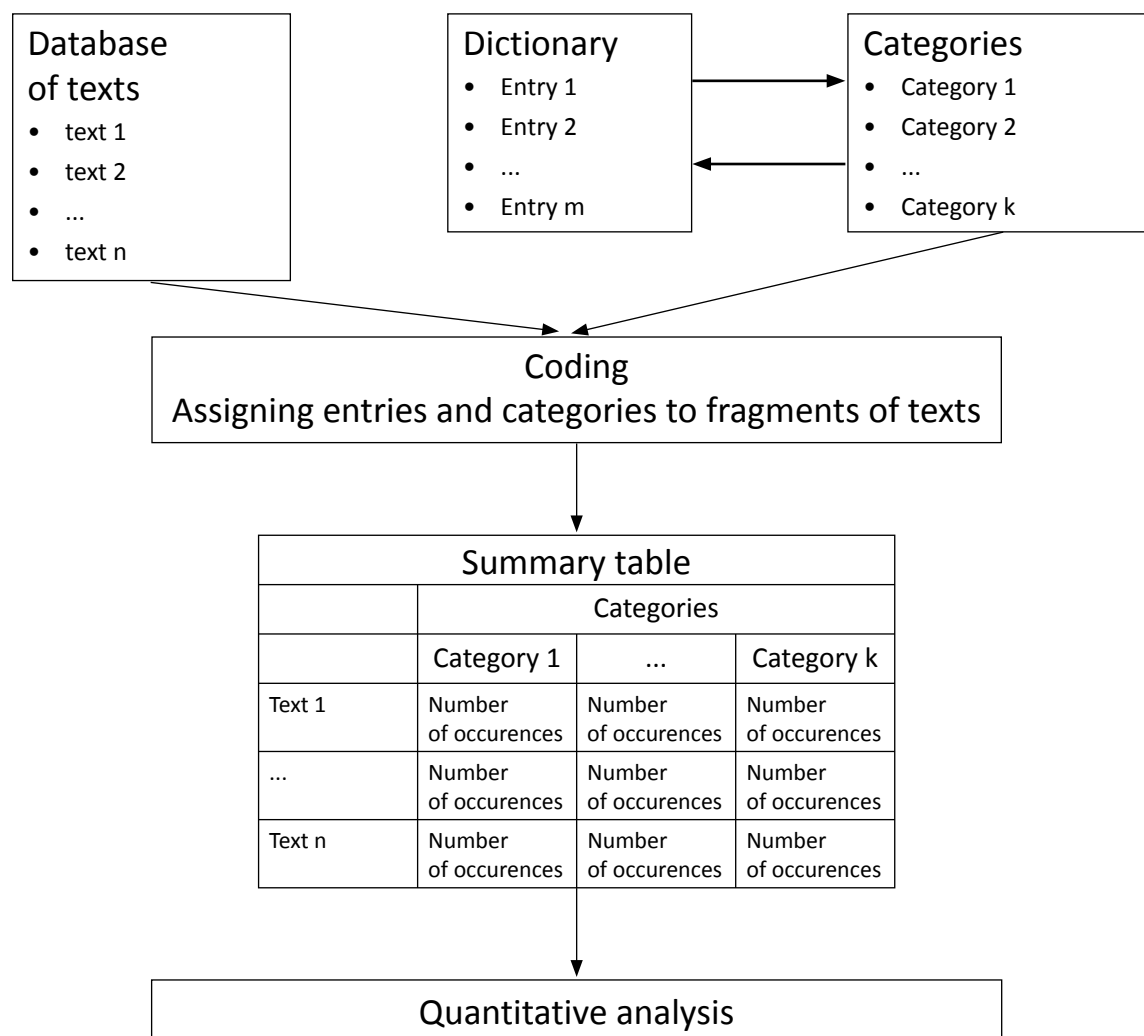### Research procedure

After consideration of the content analysis methodology, the research procedure was set to follow the stages of:
1. Sampling,
2. Selecting types of reports and the time frame,
3. Selecting categories for content analysis,
4. Creating a dictionary with entries assigned to the categories,
5. Coding reports using entries and categories,
6. Quantitative analysis,
7. Conclusions.

Figure 3
Quantitative content analysis research procedure

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┌─────────────────┐   ┌─────────────────┐   ┌─────────────────┐
│ Database        │   │ Dictionary      │   │ Categories      │
│ of texts        │   │  • Entry 1  ────────→  • Category 1   │
│  • text 1       │   │  • Entry 2      │   │  • Category 2   │
│  • text 2       │   │  • ...      ←────────  • ...          │
│  • ...          │   │  • Entry m      │   │  • Category k   │
│  • text n       │   └─────────────────┘   └─────────────────┘
└─────────────────┘
              ↘              ↓            ↙
        ┌──────────────────────────────────────────────┐
        │                  Coding                       │
        │ Assigning entries and categories to fragments │
        │                 of texts                      │
        └──────────────────────────────────────────────┘
                            ↓
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Summary table			
	Categories		
	Category 1	...	Category k
Text 1	Number of occurences	Number of occurences	Number of occurences
...	Number of occurences	Number of occurences	Number of occurences
Text n	Number of occurences	Number of occurences	Number of occurences

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                            ↓
        ┌──────────────────────────────────────────────┐
        │             Quantitative analysis             │
        └──────────────────────────────────────────────┘
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Source: author's work based on MAXQDA manual: https://www.maxqda.com/help-mx20-dictio/dictionary-based-content-analysis/schematic-course.

Research sample

Choice-based sampling was used, which is justified by the exploratory nature of the study. The sample was selected from the population of enterprises listed on the Warsaw Stock Exchange (GPW). The focus was on enterprises whose main market is Poland. Then it was decided to focus on companies in two sectors. After analyzing the information provided by the GPW, a decision was made to focus on companies grouped in the stock indices of WIG-Banki (banks) and WIG-Odzież (clothing). Detailed analysis of the information of the companies grouped in the indices led to the selection of 24 entities: 12 banks and 12 clothing companies. Selection was based on a size criterion. As a result, the sample included companies of various sizes in terms of market capitalization at the end of 2019: 7 companies with a valuation below PLN 100 million, 6 with a valuation ranging PLN 100–1,000 million, 5 with a valuation of PLN 1–10 billion and 6 companies with a valuation that significantly exceeded PLN 10 billion. The details of the sample are presented in Table 1.

Selecting types of reports and time frame

The studied sample consists of companies listed on the Warsaw Stock Exchange, which are subject to reporting obligations regulated by the Polish Financial Supervision Authority (UKNF). Annual reports, as periodic reports, contain financial data and descriptive information that present the activities and business environment of a given company in the reporting period (Pachucki & Plutecki, 2018) as discussed above. Descriptive information on the company's strategy is included in the reports of the management board. These full reports became the objects for the content analysis in the study.

Table 1
General information about the sample

Sector stock index	Company name	Market capitalization (end of 2019) (PLN mln)	Size category
WIG-Banki	PKO BP	43,075	Very large
WIG-Banki	Santander Bank Polska	31,382	Very large
WIG-Banki	Bank Pekao	26,365	Very large
WIG-Banki	ING Bank Śląski	26,345	Very large
WIG-Banki	mBank	16,491	Very large
WIG-Banki	BNP Paribas	10,024	Large
WIG-Banki	Bank Millennium	7,097	Large
WIG-Banki	Bank Handlowy	6,768	Large
WIG-Banki	Alior Bank	3,744	Large
WIG-Banki	BOŚ	662	Medium
WIG-Banki	Getin Holding	316	Medium
WIG-Banki	Getin Noble	313	Medium
WIG-Odzież	LPP	16,338	Very large
WIG-Odzież	CCC	4,528	Large
WIG-Odzież	VRG	947	Medium
WIG-Odzież	WITTCHEN	224	Medium
WIG-Odzież	CDRL	142	Medium
WIG-Odzież	Monnari	91	Small
WIG-Odzież	Lubawa	87	Small
WIG-Odzież	Protektor	66	Small
WIG-Odzież	Intersport Polska	62	Small
WIG-Odzież	Wojas	60	Small
WIG-Odzież	ESOTIQ & Henderson	27	Small
WIG-Odzież	Sanwil	10	Small

Source: author's own work.

To take into account the dynamics of the digital transformation process in the surveyed companies, the analysis was carried out on report documents from three years of operation: 2017, 2018 and 2019.

Selecting categories for content analysis

The literature overview presented in the first part of the paper shows the board scope of contemporary scientific considerations on digital transformation of enterprises. As outlined above, the perspective of digital maturity models synthesizes multiple directions of study with practical guidelines for companies. In this respect, the concept of An (2018) stands out against the models presented in the literature review with a high degree of detail and a strong embeddedness in the practice of implementing technological solutions in enterprises. For this reason, it was decided to base the dictionary category structure on the twelve areas of digital transformation proposed in this concept.

The categories are built around the main strategic directions for digital transformation of companies:
- Front office – client-related competencies:
  – Digital channel,
  – Digital commerce,
  – Digital marketing,
  – Social interactions,
- Back office – supporting competencies:
  – Digital intelligence,
  – Knowledge and content,
  – Customization and personalization,
  – Digital customer experience,
- Development competencies:
  – Digital development and operations,
  – Digital alignment,
- Infrastructure competencies:
  – Digital data,
  – Digital infrastructure.

From the practical point of view of the selection of the categorization framework, An's model has an advantage of specifying the technological solutions used in the categories. It means that basing the dictionary structure on the model creates a possibility for subsequent replication studies.

Creating a dictionary with entries assigned to the categories

The dictionary was created in several steps.

In the first step, entries (keywords) related to particular categories were selected from An's model. The keywords primarily include the names of technology solutions, electronic services and management techniques that relate to the capability areas assigned to the category. Over 150 keywords were selected.

In the next step, these entries were examined by analyzing the context in which these keywords appear on business and technological pages on the Internet. During this analysis, the list was expanded to include technologies and techniques not mentioned in An's model. Then, after translation into Polish, a similar procedure was performed. After this stage, over 200 items appeared on the list of terms.

In the next stage, the dictionary was expanded by adding to the list the conjugations[3] of the entries in the Polish language, and commonly used synonyms and spelling variants. As a result of this step, there were over 350 entries in the dictionary.

In the next step, the keywords were input into the MAXQDA[4] software together with ten annual reports from the sample. Using the software, excerpts with keywords were searched. The results were analyzed in terms of the compliance of the context in which the entries are used with the subject of digital trans-

formation. As a result, the list of dictionary entries was verified. Misleading entries were removed or adjusted to be precisely connected to digital transformation. Additionally, it was found that the reports include general terms such as digitization, digital transformation, etc. which needed to be added to the dictionary as a separate, general category. The final list of keywords consisted of 265 items, which were assigned to the previously defined twelve categories and the general one.

Coding the annual reports

Coding was conducted with the Dictio module of the MAXQDA software. The module automates the process of searching keywords in sets of documents and automatically codes categories based on the entries and a given dictionary structure.

A total of 72 corporate reports (24 companies, 3 years of operation), composed of a total of over 3.7 million words, were analyzed by the software. As a result, 6,951 excerpts were categorized in the documents. The keywords occurred in all documents over 9,000 times.

Quantitative analysis and inferring

The number of excerpts marked with codes allowed for a quantitative analysis. The excerpts were marked with categories. Information on the number of excerpts assigned to the categories in all enterprises were included in the summary table. The table includes information broken down for 2017, 2018 and 2019. For each annual report, the number of excerpts assigned to the categories were also presented in relative terms, as a frequency of occurrence compared to the general number of words in the report.

To establish a reference level to interpret the occurrence of the different categories, additional data was computed. The occurrence of phrases of strategy, business model, product, and innovation (entries were counted considering words conjugation in the Polish language) was computed for each annual report of the research sample.

Based on the above data, the inference stage was carried out.

Results

Importance of digital transformation from a strategic perspective

The measurements of the frequency of occurrence of dictionary entries in annual reports show that the topic of digital transformation can be viewed as an important strategic subject. All the keywords assigned to the general category of digital transformation consist of approximately 0.04–0.06% of all words used in the reports. Compared to the reference categories widely associated with strategic problems (strategy, business model, product, and innovation), this result proves to be at a significant level. It is higher than the scores for the innovation and business model categories, but lower than the measurements for the categories of strategy and product. The detailed results broken down into years are presented in Table 2.

Strategic directions of digital transformation

The detailed results of categories representing strategic directions of digital transformation show that companies from the sample generally focus on client-related competencies: digital channel, digital commerce, digital marketing, and social interactions. Except for the digital customer experience and digital development and operations, in the remaining categories the keywords were counted at negligible levels. The results are shown in Table 3.

Differences among the sample group

The problem of digital transformation was represented in reports of enterprises to a varying degree. Details are presented in Table 4.

Table 2

Strategic importance of digital transformation compared to reference categories

Categories		Frequency measures		
		2017	2018	2019
Reference categories	Strategy	0.102%	0.103%	0.117%
	Business model	0.008%	0.010%	0.009%
	Product	0.151%	0.150%	0.152%
	Innovation	0.027%	0.024%	0.021%
Digital transformation – general category		0.043%	0.052%	0.060%

Note. The measures show the frequencies with which the defined keywords were found in the annual reports of the sample groups.

Source: author's own work.

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[3] The procedure was conducted due to specificity of Polish language grammar.
[4] MAXQDA is one of the leading software packages designed for qualitative data analysis. The software contains the Dictio module, which is designed to automatically code excerpts of text based on a dictionary defined by the researchers.

Table 3

Strategic importance of digital transformation broken down into detailed categories

Categories	Frequency measures		
	2017	2018	2019
Front office – client-related competencies			
Digital channel	0.05%	0.05%	0.05%
Digital commerce	0.01%	0.01%	0.02%
Digital marketing	0.02%	0.02%	0.03%
Social interactions	0.01%	0.01%	0.01%
Back office – supporting competencies			
Digital intelligence	0.00%	0.00%	0.00%
Knowledge and content	0.00%	0.00%	0.00%
Customization and personalization	0.00%	0.00%	0.00%
Digital customer experience	0.01%	0.01%	0.01%
Development competencies			
Digital development and operations	0.02%	0.02%	0.02%
Digital alignment	0.00%	0.00%	0.00%
Infrastructure competencies			
Digital data	0.00%	0.00%	0.00%
Digital infrastructure	0.00%	0.00%	0.00%
General category	**0.04%**	**0.05%**	**0.06%**

Note. The measures show the frequencies with which the defined keywords were found in the annual reports of the sample groups.

Source: author's own work.

The table shows high variation of the representation of digital transformation in the strategies of the sample companies. The highest value of the frequency ratio, i.e. 0.42%, was recorded in the reports of Alior Bank (2018), mBank (2018) and Santander Bank Polska (2017). The lowest value, over 40 times lower at 0.01%, was observed in the documents ESOTIQ & Henderson (2017 and 2018) and Sanwil (2017 and 2018).

The scope of these differences largely coincides with the sectoral division of the studied sample. Banks scored on average several times higher values of indicators than enterprises from the clothing industry. Details are presented in Table 5.

Table 5

Strategic importance of digital transformation broken down by industries

Industry	2017	2018	2019
Banking	0.25%	0.26%	0.29%
Clothing	0.05%	0.06%	0.09%

Note. The measures show the frequencies with which the defined keywords were found in the annual reports of the enterprises from the sample groups.

Source: author's own work.

Table 4

Strategic importance of digital transformation shown by enterprises from the research sample

Company	2017	2018	2019
Alior Bank	0.33%	0.42%	0.41%
Bank Handlowy	0.26%	0.15%	0.29%
Bank Millennium	0.27%	0.30%	0.27%
Bank Pekao	0.18%	0.20%	0.20%
BNP Paribas	0.17%	0.23%	0.32%
BOŚ	0.04%	0.07%	0.07%
CCC	0.12%	0.14%	0.34%
CDRL	0.06%	0.06%	0.07%
ESOTIQ & Henderson	0.01%	0.01%	0.02%
Getin Holding	0.07%	0.10%	0.14%
Getin Noble	0.05%	0.16%	0.16%
ING Bank Śląski	0.34%	0.31%	0.35%
Intersport Polska	0.08%	0.07%	0.10%
LPP	0.08%	0.13%	0.20%
Lubawa	0.04%	0.05%	0.04%
mBank	0.32%	0.42%	0.39%
Monnari	0.03%	0.07%	0.06%
PKO BP	0.18%	0.25%	0.27%
Protektor	0.02%	0.01%	0.03%
Santander Bank Polska	0.42%	0.38%	0.40%
Sanwil	0.01%	0.01%	0.03%
VRG	0.03%	0.02%	0.03%
WITTCHEN	0.07%	0.08%	0.09%
Wojas	0.08%	0.08%	0.08%

Note. The measures show the frequencies with which the defined keywords were found in the annual reports of the enterprises from the sample group.

Source: author's own work.

Differences are also visible based on the size of the enterprises. The smaller the enterprise, the less the keywords related to digital transformation appear in the annual reports. However, it is worth pointing out that in all groups, there is a noticeable increase in scores in subsequent years. Details are presented in Table 6.

Table 6

Strategic importance of digital transformation broken down by size categories

Size of the company	2017	2018	2019
Small	0.04%	0.04%	0.05%
Medium	0.05%	0.06%	0.07%
Large	0.24%	0.23%	0.32%
Very large	0.28%	0.29%	0.31%

Note. The measures show the frequencies with which the defined keywords were found in the annual reports of the enterprises from the sample groups.

Source: author's own work.

Conclusions and limitations

The information presented above show that: (a) digital transformation can be measured from a strategic perspective, (b) the main strategic directions for digital transformation in research group are linked to areas of interaction with clients, (c) the level of strategic commitment to digital transformation is differentiated by the size of enterprises and their sectors. Digital transformation-related terms were found in corporate annual reports at a frequency that is comparable to other keywords commonly linked to strategy. Additionally, a growing interest related to digital transformation was observed in the subsequent studied years. The increase was observed in all examined cross-sections.

Based on the presented data, it can be concluded that the digital transformation strategy in the sample companies focused mainly on areas of interaction with clients. The areas of digital channels and digital commerce stood out in the analysis. In connection with the above, it should be concluded that in the studied sample, digital transformation is not a comprehensive process, but concerns selected areas of business activities. The areas that affect establishing and maintaining relationships with the client are of particular importance.

The banking industry puts a stronger emphasis on digital transformation in its strategies compared to clothing companies. This may be related to a longer history of electronic services in Polish banks. E-banking, which was introduced in Poland 20 years ago, can be viewed as the first activity in which banking entities began to convert some of their processes to their digital equivalents. A similar trend in the clothing industry is to build their own branded online stores. This practice was started by industry leaders 10 years ago and is still in development. Not all clothing companies from the sample run their own online stores yet. Meanwhile, all researched banks provide electronic banking services and most of them also have banking applications for smartphones. The most advanced banks have an integrated platform in which, regardless of the channel (www, smartphone, telephone), most banking services are provided. In the clothing industry, the advancement of such solutions is at much lower levels. The obtained results reflect these differences.

Another factor that significantly differentiates the sample is the size of the enterprise, measured by capitalization. Enterprises classified as large and very large, i.e. those whose capitalization exceeded PLN 1 billion at the end of 2019, are much more focused in their strategies on topics related to digital transformation. Perhaps size (especially measured by valuation) means easier access to the financial resources which are necessary to implement digital transformation projects on a larger scale.

Based on the obtained results, it can be concluded that the designed method has proved successful. Nonetheless, the results were obtained on a relatively small, choice-based sample, which means they should be a subject of further studies. The developed method proves that digital transformation can be measured from a strategic perspective but using it on a greater scale requires further development and verification on a larger sample.

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WE RECOMMEND

EDMO (European Digital Media Observatory) Week: United Against Online Disinformation

The European Digital Media Observatory brings together fact-checkers and academic researchers with expertise in the field of online disinformation, and open to collaboration with media organizations and media literacy practitioners.

It promotes scientific knowledge on online disinformation, advances the development of EU fact-checking services and supports media literacy programs. EDMO also supports public authorities assessing the implementation of the EU Code of Practice on Disinformation.

Between 7–11 June, the European Digital Media Observatory brought together 500+ participants to celebrate its first annual conference, EDMO Week. The event gathered a wide range of stakeholders jointly working to tackle online disinformation, including academics, fact-checkers, media literacy experts, regulatory authorities, online platforms, civil society, and the policy sector.

Every afternoon EDMO Week set the scene for lively discussions with more than 50 speakers on a wide range of key topics: from the need for a multi-stakeholder approach in tackling online disinformation to fact-checking in the context of a global pandemic, and from the role of research and policy to media literacy and other local initiatives.

All recordings can be accessed on EDMO YouTube channel: https://www.youtube.com/hashtag/edmoweek
More about EDMO and its activities at: **https://edmo.eu/edmo-at-a-glance/**