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The Research and Development Efficiency of Institutes of the Polish Academy of Sciences and the External Factors Affecting It

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ABSTRACT

Objective: The aim of the research is to assess the research and development efficiency of the institutes of the Polish Academy of Sciences (PAS) in 2019 and to identify external factors that have a significant impact on it.

Research Design & Methods: A two-stage procedure in the field of DEA methodology was used. In the first stage, the efficiency of PAS institutes was estimated using alternative BCC and SBM models. In the second stage, a Tobit model was used to isolate external factors significantly influencing efficiency. Given the data available, two types of research and development (R&D) efficiency were analysed: publishing efficiency and combined publishing and implementation efficiency.

Findings: A significant share of institutes are highly inefficient (nearly a half of the units in terms of publishing efficiency and a third in terms of combined efficiency). The fields in which a given

scientific unit conducts research which significantly affect publication efficiency differ from those that significantly affect combined efficiency. Both types of efficiency are significantly negatively affected by the increase in the scientific category of the unit.

Implications/Recommendations: The source of high research and development inefficiency among a significant number of institutes is the fact that they also generate other outputs than those considered in the work. The majority of institutes do not apply to the R&D sphere. The significant negative impact of the increase in the scientific category on R&D efficiency indicates that future focus should prioritise the quality of publications over their quantity.

Contribution: The efficiency of the research and development activities of the PAS institutes was assessed after the introduction of the last reform of Poland's system of science and higher education in 2018 (such studies have yet to be carried out). It is also important to use a two-stage approach within the DEA methodology in order to isolate external factors that significantly influence this efficiency.

Article type: original article.

Keywords: public research institutes, efficiency, R&D, DEA.

JEL Classification: C67, I23, O31, O32.

1. Introduction

In Poland, higher education and scientific and research institutes are the main public entities responsible for scientific and research development. While there is a great deal of research dedicated to higher education, little has been done on scientific and research institutes. What has been researched shows that they are not functioning properly (Brzezicki, 2022). One reason for this is that most institutes conduct research and development (R&D) on a small scale. An indication is the audit conducted by the Supreme Audit Office (SAO) from 2020, which reported that „attention is drawn to the relatively minor share in total revenues of proceeds from the basic activity of institutes, which encompasses conducting research and development efforts aimed at their practical implementation and application. The share of revenues on this account in 2018 and 2019 was 9.5% and 11.5%, respectively” (SAO, 2020, p. 29). The same report stresses that „research institutes covered by the audit were characterised by a favourable financial situation in the period under review” (SAO, 2020, p. 11). This means that research institutes made money, but not necessarily by means of their core business.

A more complete implementation of a knowledge-based economy in Poland and reduction of technological backwardness, through regional innovation systems, influencing the national innovation system, requires a check on the performance of the main actors responsible for the creation of scientific and research activities (Łącka & Brzezicki, 2023). This, in turn, should increase regional and national

innovativeness. There are three groups of institutes in Poland (Brzezicki & Prędko, 2023b): institutes of the Polish Academy of Sciences – PAS (approximately 60 units), research institutes operating within the Łukasiewicz Research Network (over 20 units), and other entities conducting mainly scientific activities on an independent and continuous basis (approximately 50 units). The first and second groups are clustered in specific networks where a central unit functions and the institutes are its sub-units. All institutes, whether scientific or research, belong to the public finance sector, which subsidises their activities. Therefore, the expenditure of public funds in relation to the products the institutes bring forth must be rationalised.

This paper is a continuation of the study presented in (Brzezicki & Prędko, 2023b), which analysed the efficiency of a wider group of research institutes in Poland in 2019. That paper described a number of difficulties, and the outcome of the search for a solution to these difficulties comprises the present study. Brzezicki and Prędko (2023b) concluded that the R&D activities of a significant share of the institutes in Poland in 2019 is inefficient. The authors attributed this to a range of causes, including the heterogeneity of the group of institutes as a whole, and the existence of subgroups of institutes that function in a different manner. This led us to conduct an in-depth analysis of efficiency in the selected subgroups. The previous study only estimated the efficiency of scientific and research institutes, leaving aside external variables that may influence efficiency levels.

The main purpose of this paper is to put to analysis the efficiency of R&D activity of institutes of the PAS by means of the DEA (Data Envelopment Analysis) methodology. In this study, using the so-called the two-stage approach, external factors significantly influencing the (in)efficiency of the analysed group of institutes of the PAS were also identified.

In addition to its cognitive value and filling the research gap found (to estimate the level of efficiency of public research institutes taking into account the impact of external factors on their performance), the study is intended to provide information for the management of PAS institutes (how other external factors may affect their efficiency and how to optimise their structure), as well as the government in order to develop a more rational scientific and research policy based on the results of this performance-oriented research on PAS activities.

2. Literature Review

A systematic review of the global and Polish literature was done. Polish research has focused mainly on legal and organisational issues (Kozłowski, 2007; Barcikowska, 2016, 2021; Trzmielak & Krzymianowska-Kozłowska, 2020). A single monograph (Łącka, 2011) presented a more comprehensive and quantitative study in the field. Empirical research was carried out on the technological cooperation of 50 research and development units with enterprises. The author analysed the

financing sources of their activities, the share of revenues outside the statutory activities, the number of patents, patent applications, licences sold, industry-oriented projects, organisational implementations, participation in research programmes, forms of cooperation between R&D units and enterprises, and barriers to this cooperation. The study has shown that SRI (current research institutes) of that time should become the most important link in the transfer of knowledge and technology from the science and research sector to the economy.

Another interesting study (Brzezicki, 2022) analysed three groups of scientific and research institutes in Poland, including those of the PAS, the Łukasiewicz Network and others. It took into account data from 2019 on the number of patents filed and obtained, as well as the share of funds from enterprises and funds collected from foreign sources in the total funds. The research shows that the institutes focused primarily on obtaining financing from enterprises, and then on the application for and execution of patents. The acquisition of foreign resources only came third. It is worth noting that some general institutes came out with a performance similar to that of the institutes of the Łukasiewicz Research Network (measured by the synthetic index of development). It has also been shown that some institutes of the PAS scored better than a group of general research institutes, taking into account the average development index for these units. This indicates that several PAS units are outstanding, though they exist alongside many that perform poorly.

It is more and more common for authors who study scientific and research institutions to pay attention to the field of science in which a given public institution operates. Coccia (2008) estimated the efficiency of Italian state research institutes considering the represented field of activity. The findings indicate that institutes operating in the technology, engineering and information sciences were the most efficient. Institutes of basic sciences, natural sciences, earth science and, lastly, social sciences and humanities, followed. Research evidence suggests that the results of these entities' activities depend on the field of science which they represent.

Analysing the role of knowledge specialisation in public research institutes (PRIs), de la Torre *et al.* (2021) arrived at similar conclusions. They listed three groups of units. The first group of PRIs relies on external infrastructure to exploit the results of their knowledge: spin-offs, incubators and research commercialisation companies. The second group included PRIs that obtain a significant part of their research funds competitively and rely on commercialisation in the market for both research results (through patenting) and service provision (through specialised companies). The third group included PRIs that collaborate with users through government-funded research and collaborate directly with users through research contracts, consultancy services and service provision. The latter group is managed by the PRI but, unlike the other two groups, they do not rely on external companies.

Depending on the field of science they represented, the institutes used other channels of technology transfer, as well as other resources to effectively accomplish their goals. By way of example, institutes with a “market commercialisation” transfer profile had to plan their resources in such a way as to ensure the ability to manage relations with external commercialisation companies, establish corporate spin-offs and seek financing for them.

Huian, Bisogno and Mironiuc (2023) analysed whether the technology transfer scores achieved by Romanian PRI – measured as the ability to generate patented technologies – were positively related to institutional, human, commercial and financial factors. The authors demonstrated that qualified human resources and commercial resources (including technology transfer offices and spin-offs) had a significant, positive impact on the generation of technology patents, as did institutional factors and fields of research. On the other hand, the public funds received actually reduced patent activity. Meanwhile, institutional factors showed no relation to patent activity or scientific publications.

According to Lynskey (2009, p. 161), “there is evidence that knowledge transfers from national research institutes are particularly relevant for companies in strategic industries such as biotechnology, information technology and new materials”. The research conducted for this paper demonstrates that small technology-based companies have an edge over large enterprises in using the knowledge of scientists from research institutes.

Brzezicki and Prędko (2022) present a review of variables used to study the efficiency of research institutes. However, no studies analysing the impact of external variables on the efficiency of research institutes or scientific institutes have been done. This led us to cite relevant studies in (Brzezicki & Prędko, 2023a) on universities that conduct activity similar to scientific and research institutions.

We considered two groups of external variables. The first are those that represent neither inputs nor outputs in the model used to measure the efficiency of facilities. These variables are directly related to the surveyed institution (e.g., year of establishment, employment structure, nature of conducted activity, including the scientific fields in which research or education is conducted). The second were general variables (location of the surveyed units, regional wealth, size or structure of the university’s funding sources activities). These variable types aside, the inclusion of specific variables depends primarily on the purpose of the analysis and the possibility of obtaining relevant data.

The results of the literature analysis of both the variables adopted in DEA models and external variables indicated that human resources and their structure, the areas of activity of scientific and research units and the financial resources allocated to R&D activities are all important. We therefore decided to adopt some

of these variables as data for the DEA model and others as exogenous variables influencing efficiency levels.

3. Methodology

DEA methodology is used to examine economic units whose efficiency is analysed as specific production units that obtain one or many types of outputs from specific types of inputs. Hence, the nomenclature and considerations are closely connected to the theory on the production process.

To measure efficiency and analyse the external factors which affect it, a two-stage procedure was used (see Hoff, 2007, for details). In the first stage, the efficiency measures of the units are calculated. Stage two uses a regression model to examine the extent to which the external factors affect efficiency. The measures obtained in the first stage are treated as observations concerning this dependent variable. In the first stage of the procedure calculations were done with MaxDEA software, while Gretl was used in the second stage.

For this paper, the first stage used the output-oriented BCC model (envelopment form) to measure efficiency (Cooper, Seiford & Tone, 2006). This approach was adopted because performing an analysis of the possibility of reducing the number of inputs consumed by units seemed pointless. Examining the potential for increasing outputs representing the effects of R&D activity appeared to be far more promising. In addition, due to the varying size and degree of development and involvement of institutes in R&D activity, it was assumed that there would be variable returns to scale.

If there are many outputs, the BCC model allows one to consider only the proportional growth of outputs¹. To avoid this arbitrary assumption, for the case of two outputs, the SBM model was used in the first stage, making it possible to analyse the disproportionate increase of outputs². The SBM model was also output-oriented and offered variable returns to scale (Tone, 2001). Like the previous measure, this one is not less than one and is equal to one for the efficient unit³.

Stage two involved the use of a censored regression model to analyse the significance of the impact of external factors on efficiency, specifically the type I Tobit model with a threshold value of zero (Kostrzewska, 2011). A censored regression model is used because the efficiency measure values are not less than one – that is, it is bound on the left side. Moreover, pursuant to the design of DEA models

¹ This is a “radial” model.

² This is a “non-radial” model.

³ Both types of efficiency measures were interpreted in the empirical part of the paper, using the example of extremely inefficient units.

that measure efficiency, there is usually more than one efficient unit – that is, with a measure value of one⁴.

Crucially, part of the empirical work examined only the direction and significance of the impact of individual exogenous factors on the efficiency of the objects under analysis. In this case, backward stepwise regression, consisting in the gradual elimination of irrelevant factors, starting with the most irrelevant (the largest p -value), was used. Proceedings were discontinued when the p -value for all factors remaining in the model fell below 0.1.

4. Gradual Selection of Categories of Study

4.1. General Remarks

2019 was chosen as the evaluation period, for the same reasons as in (Brzezicki & Prędko, 2023b). It is the year where the largest number of reports on research and development activities is found⁵ (the reports on R&D were obtained on the basis of a request for access to public information). 2019 was also the first full year following the introduction of the higher education reform in 2018.

Table 1 presents the variables used in the previous paper (Brzezicki & Prędko, 2023b).

Table 1. Categories Used to Assess the Efficiency of Research Institutes in (Brzezicki & Prędko, 2023b)

Specification	Designation	Explanation
Inputs	x_1	number of researchers and technicians involved in R&D activity
	x_2	number of other support personnel (e.g., administrative)
	x_3	internal funds for R&D activity (in thousand PLN)
	x_4	external funds for R&D activity (in thousand PLN)
Outputs	y_1	total number of patent applications and patents obtained
	y_2	total number of publications

Source: the authors.

As regards the factors representing labour (x_1, x_2), researchers and technicians were separated as two different types of employees, and the measurement unit was changed from persons to the more precise “FTE” (full-time equivalent). As defined in the *Report on Research and Development Activities*, FTE is the ratio of working

⁴ Hence, it was decided to forego truncated regression (Simar & Wilson, 2007) and simple linear regression models (Banker & Natarajan, 2008), which were used in the second stage of the relevant procedure.

⁵ For the sake of confidentiality, entities refused to share more recent data (though a small number of institutes also sent reports for 2020).

hours actually spent on R&D in a given reference period to the total number of hours formally worked in the same period by a person⁶.

The previous paper also considered only internal staff – people who are employed in a given unit. Many institutes consider staff to comprise people not necessarily employed in a given unit, including doctoral students. Such external staff are less associated with the institute. For our purposes, these staff are treated as an external factor and it was to be determined whether they had a significant impact on the research and development efficiency of individual units.

On a similar vein, we approached factors representing capital (x_3, x_4), while internal funds (x_3) were considered as input from the institute. External funds, or those received from other units for the purpose of a given institute's internal R&D activity, were initially assumed to be an external factor influencing efficiency; that is because it partly remains beyond the control of the examined unit.

Another input expressing the unit's capital – the gross value of scientific and research equipment in thousand PLN – was adopted.

4.2. Publication Efficiency

As only some PAS institutes generate patents or submit patent applications, it was first decided to examine only the publication efficiency of the units expressed in the number of publications⁷ in 2019 (former output y_2). The data collected applied to 60 of the 68 units, thus a significant portion of the overall “population”.

Data obtained from the report *Information on the Activities of a Scientific Unit of the PAS* were very significant. Comparative analysis of data sources revealed that fewer publications were available in the RAD-on system⁸ (RAD-on, 2023) than in the new data source for as many as 47 PAS institutes. The opposite held for only 13 units, for which it was decided to always take the higher value of the two obtained from the sources for the number of publications of a given institute.

To deepen the analysis, an attempt was made to break down the publications by type⁹. However, this proved partially unfeasible, because, in the report *Information*

⁶ The FTE for one person must not exceed a value of 1. The FTE for a group is sum of ratios for its members.

⁷ The conversion thereof into ministerial points would be too tedious and laborious, and ready-made data in this area are not available.

⁸ The RAD-on system is part of the Integrated Information Network on Science and Higher Education, the largest public system in Poland in terms of the scope of data collected, which helps the Ministry of Science and Higher Education and other state agencies to shape science policy (the data are publicly available).

⁹ The authors' core intention was to extract a number of monographs, which often require much more effort than creating smaller publications, such as a chapter in a monograph or an article. Obviously, the authors are aware that there can be many exceptions to this rule.

on the Activities of a Scientific Unit of the PAS, the chapters in the monograph are counted together with other monographs. It was also pointless as the number of monographs identified for many institutes turned out to be negligible compared to, for example, the number of articles they published.

We also sought to examine whether a unit's scientific category and the field(s) of research it was involved in had an impact on publishing efficiency. To this end, appropriate external factors were introduced into the model. The scientific category was expressed by a discrete variable with the values 1, 2 and 3 denoting the category¹⁰ B, A and A+, respectively. In turn, the domains were expressed in zero-one variables. Notably, a few of them could simultaneously assume the value of one for a given institute if that institute conducted scientific activity in many fields¹¹.

A summary, in the form of categories adopted for the first version of empirical model, which was used to examine the publication efficiency, was presented in Table 2.

Table 2. The Set of Categories Adopted in the First Version of the Empirical Model (Publication Efficiency)

Specification	Designation	Explanation
Inputs	x_1	internal researchers involved in R&D activity (in FTE)
	x_2	internal technicians involved in R&D activity (in FTE)
	x_3	remaining internal support staff, e.g., administrative (in FTE)
	x_4	gross value of research equipment (in thousand PLN)
	x_5	internal funds for R&D activity (in thousand PLN)
Output	y	total number of publications
External factors	z_1	external researchers involved in R&D activity (in FTE)
	z_2	external technicians involved in R&D activity (in FTE)
	z_3	remaining external support staff, e.g., administrative (in FTE)
	z_4	external funds for R&D activity (in thousand PLN)
	z_5-z_{10}	fields in which the unit conducts scientific research ^a : natural sciences, engineering and technology, medical and health, agricultural and veterinary, arts and humanities, social sciences; variables 0–1
	z_{11}	scientific category of the unit – 1(B), 2(A), 3(A+)

^a The distribution of fields in force in 2019.

Source: the authors.

¹⁰ The analysed group contains no units characterised by the categories C and B+.

¹¹ Therefore, it was not required to extract the reference category to avoid linear dependence of these variables. It should also be noted that it was decided not to assign variables to disciplines, because too many of them were often assigned to a given institute.

The next step was to apply the two-stage procedure described in the methodological part. This yielded measures of publishing efficiency for 60 institutes of the PAS covered by the analysis (stage I), with the extraction of external factors significantly affecting this efficiency (stage II). The only relevant factors proved to be z_8 and z_9 (conducting scientific research in the agricultural and veterinary sciences as well as humanities and arts, respectively).

These results shall not be further analysed here. The statistical insignificance of external personnel factors (z_1 – z_3) and external funds (z_4) led us to combine them with appropriate inputs (x_1 – x_3 and x_5). This yielded four inputs, constituting the components of the second version of empirical model.

We would be remiss to omit external employees and funds, which in practice have too much influence on the research and development activities carried out by institutes. While external employees and funds cannot play the role of external factors, and although these employees remain, at least partially, beyond the control of the entities under analysis, they will nonetheless be treated as inputs. Unfortunately, they cannot be identified individually as separate inputs in relation to the relevant internal categories as the size of the input categories would then be too large relative to the entire research group. That would negatively affect the discriminatory power of the model. Consequently, these external factors were to be combined with the appropriate internal inputs by means of aggregation.

The wisdom of this move was confirmed by the correlation analysis performed on aggregated values, which are significantly positively related to the only output – the number of publications. This excludes the category $x_3 + z_3$ (correlation of approx. 0.21), i.e., the total number of remaining support staff. This exception was initially adopted as an external factor in the second version of the empirical model, thus indicating that such personnel do not directly participate in scientific or research and development activities.

Under the next version of the model, it was decided to continue to analyse the impact of the unit's scientific category and the field(s) in which it conducts research on its publishing efficiency. Table 3 presents the categories of the model's second version.

After once again carrying out the two-stage procedure described in the methodological part, it appears that major external factors identified in the first version of the model retain their significant impact on publication efficiency. We believe that this validates the results obtained in the second version of the model. Finally, the scientific category of the institute is yet another important factor.

Because the remaining support staff is not an external factor significantly affecting publication efficiency, the empirical model needs to be slightly revised. The authors believe that it should have its place in the model – in practice, administrative employees assist in the formal implementation of research and development

tasks (documentation, accounting, etc.). In addition, this variable has a weak but positive correlation with the number of publications.

Table 3. The Set of Categories Adopted in the Second Version of the Empirical Model (Publication Efficiency)

Specification	Designation	Explanation
Inputs	x_1	researchers involved in R&D activity (in FTE)
	x_2	technicians involved in R&D activity (in FTE)
	x_3	gross value of research equipment (in thousand PLN)
	x_4	funds for R&D activity (in thousand PLN)
Output	y	total number of publications
External factors	z_1	other support personnel, e.g., administrative (in FTE)
	z_2-z_7	fields in which the unit conducts scientific research: natural sciences, engineering and technology, medical and health, agricultural and veterinary, arts and humanities, social sciences; variables 0–1
	z_8	scientific category of the unit – 1(B), 2(A), 3(A+)

Source: the authors.

In view of the above, Table 4 presents the final form of the model used to measure the publishing efficiency of the PAS institutes and to isolate external factors that influence it.

Table 4. The Set of Categories Adopted in the Final Version of the Empirical Model (Publication Efficiency)

Specification	Designation	Explanation
Inputs	x_1	researchers involved in R&D activity (in FTE)
	x_2	technicians involved in R&D activity (in FTE)
	x_3	other support staff, e.g., administrative (in FTE)
	x_4	gross value of research equipment (in thousand PLN)
	x_5	funds for R&D activity (in thousand PLN)
Output	y	total number of publications
External factors	z_1-z_6	fields in which the unit conducts scientific research: natural sciences, engineering and technology, medical and health, agricultural and veterinary, arts and humanities, social sciences; variables 0–1
	z_7	scientific category of the unit – 1(B), 2(A), 3(A+)

Source: the authors.

4.3. Combined Publishing and Implementation Efficiency

The review of the literature and websites of the institutes shows that their R&D activities also include expert opinions, reports and analyses, which, unfortunately, are only available to a small extent. The collection of such data turned out to be unfeasible, at least for the moment.

This is important as the high publishing inefficiency of some units may result from the fact that the observed inputs are used for purposes other than publishing.

Therefore, in the frame of a separate empirical model, institutes with a positive value of patents or patent applications (y_2) were also analysed – together with a positive output y_1 value (number of publications). Data on this second output was obtained from reports on research and development activities sent by the institutes.

Unfortunately, this group comprises only 28 PAS institutes. With the total number of seven inputs and outputs, this gives the model too little discriminatory power – as many as 20 units are then fully efficient. The analysis, then, brings little information to the considerations regarding joint publication and implementation efficiency.

Table 5. The Set of Categories Adopted in the Empirical Model (Publication and Implementation Efficiency)

Specification	Designation	Explanation
Inputs	x_1	researchers and technicians involved in R&D activity (in FTE)
	x_2	other support personnel, e.g., administrative (in FTE)
	x_3	gross value of research equipment (in thousand PLN)
	x_4	funds for R&D activity (in thousand PLN)
Outputs	y_1	total number of publications
	y_2	total number of patents and patent applications
External factors	z_1-z_6	fields in which the unit conducts scientific research: natural sciences, engineering and technology, medical and health, agricultural and veterinary, arts and humanities, social sciences; variables 0–1
	z_7	the unit's scientific category – 1(B), 2(A), 3(A+)

Source: the authors.

It was therefore decided to aggregate two similar categories related to the labour factor – researchers and technicians involved in R&D. At the same time, it was once again studied whether the remaining support staff could act as an external factor. Once more, it appeared that remaining support staff does not have a significant impact on the total efficiency, but at the same time, for practical reasons, it cannot

be ignored¹². Therefore, it plays the role of input – similarly as in the final version of the model used to measure publication efficiency.

Table 5 presents the final form of the empirical model used to measure publication and implementation efficiency and to determine external factors significantly influencing it.

5. Description of the Results

5.1. Publication Efficiency

Figure 1 shows a histogram of the publication efficiency measure, obtained in the first step of the appropriate two-stage procedure and performed for the final version of the empirical model.

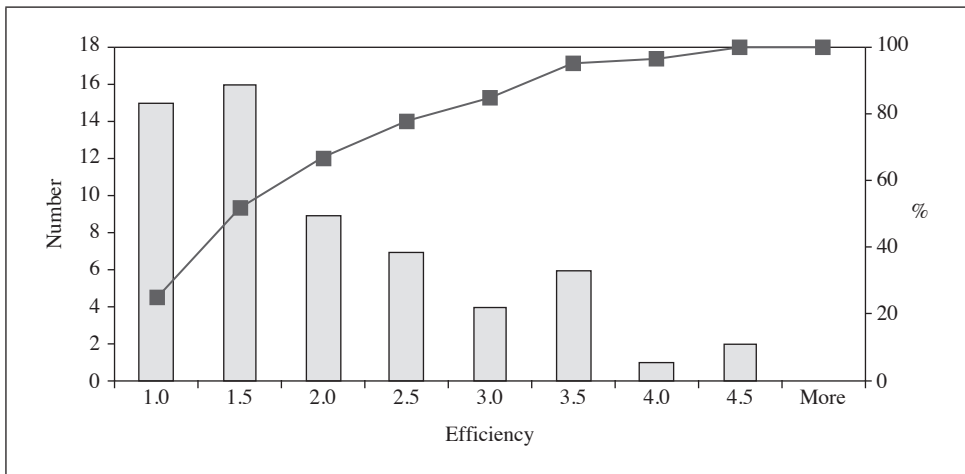


Fig. 1. Histogram of Efficiency Scores for the Final Version of Empirical Model

Notes: polyline – cumulative frequency in percent.

Source: the authors.

The research results indicate that 15 PAS institutes, or 25% of the entire group, operate efficiently¹³ in terms of the number of publications in relation to the input of labour (x_1-x_3) and capital (x_4-x_5). The fraction of units characterised by low inefficiency in the range (1; 1.5] – 26.67% (16 institutes) is equally relevant. On the other

¹² Yet another vital element is that this factor is weakly but positively correlated with both outputs. In general, the situation is similar to that of empirical model of publishing efficiency.

¹³ Notably, the measure of efficiency is relative here, i.e., institutes are compared with one another, and not with respect to some external benchmark.

hand, the efficiency measure of almost half of the institutes (48.33%, 29 institutes) exceeds 1.5. This means that these units could potentially publish over 50% more scientific papers than they currently do. However, this inefficiency for most units is still much lower than in (Brzezicki & Prędko, 2023b), which used an appropriate empirical model¹⁴.

In the second stage of the procedure, factors other than inputs or outputs were also identified, significantly affecting the efficiency of the PAS institutes in 2019. The publication efficiency was negatively affected by research conducted by a given unit within agricultural and veterinary sciences, while research conducted in humanities boosted the efficiency.

The results indicated that the higher (better) the scientific category of an institute, the lower (weaker) its level of publication efficiency. That is, units with higher categories focus on higher quality, rather than the number of publications they put out. They also attempt to operate in more comfortable conditions, involving more employees and different types of capital. Other external factors, listed in Table 4, did not have a statistically significant impact on publication efficiency.

5.2. Combined Publishing and Implementation Efficiency

As there is more than one output in the model, in the first stage of the procedure the publication and implementation efficiency measure were calculated by means of two models, BCC and SBM. This made it possible to analyse both radial and non-radial efficiency. In other words, it became possible to make proportional and non-proportional modifications in output amounts, respectively. Nevertheless, the same facilities under both models were considered efficient, and at all times the measure of efficiency for a given unit obtained in the SBM model was not lower than that measured with the BCC model.

Figure 2 presents the total histograms of efficiency measures obtained from the BCC and SBM models.

Half of the institutes (14) are efficient. This may partially be the result of the model still having too weak discriminatory power. The number of slightly inefficient institutes is similar for both models – 5 and 4 for the BCC and SBM models, respectively.

Assuming that only proportional changes in outputs can be made, the maximum value of the measure for the BCC model does not exceed 3.5. This is qualitatively similar to the maximum for measures of publication efficiency generated using the

¹⁴ However, the 2023 paper considered a much larger group of 121 Polish institutes, characterised by a positive number of publications and a set of inputs which, as described earlier, was substantially modified in this paper.

third empirical model. The SBM model involves three extremely inefficient units, with inefficiency exceeding 3.5.

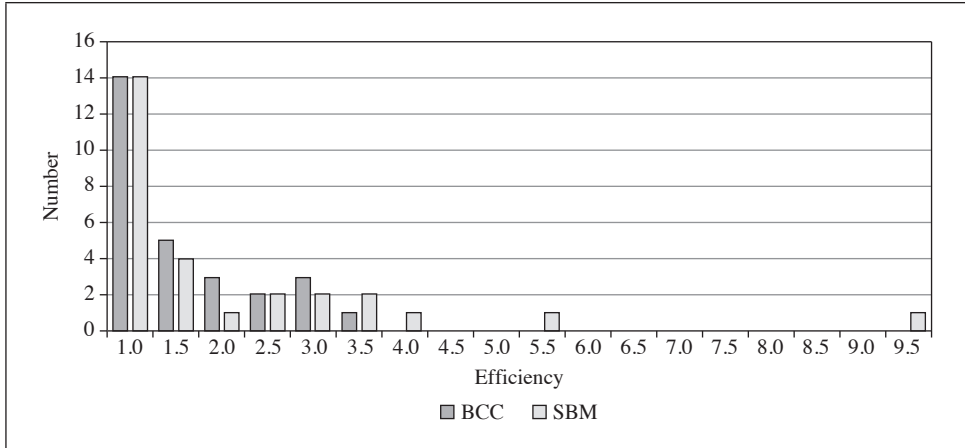


Fig. 2. Histogram of Efficiency Scores for the BCC and SBM Models

Source: the authors.

Again, the value of the measure is interpreted differently for the two models. This difference shall be discussed through an example of the two most inefficient institutes, for which the value of the measure is 3.19 (BCC) and 9.34 (SBM), respectively. For BCC this means that a given institute, with the current volume of inputs, would be able to obtain more than three times as many publications, patents, and patent applications. For SBM, the corresponding value means that the unit could potentially obtain more than nine times the average relative increase in outputs¹⁵.

Finally, the least efficient units under the BCC and SBM models are two different institutes. In general, the rankings of inefficient units imposed by the BCC and SBM are practically independent – the rank correlation coefficient is approximately 0.033. On the other hand, four units occupy identical places in both rankings.

Returning to the analysis of external factors, there is the same set of categories that significantly affect efficiency, regardless of which method of measuring it is used in the first stage (BCC or SBM model). This lends credence to the results obtained in this area.

As in the case of publication efficiency, the increase in the scientific category of a unit has a negative impact on the total efficiency (publishing and implemen-

¹⁵ It is the average of the relative increments of individual outputs, which do not have to be identical, i.e., proportional, as in the radial BCC model.

tation). Confirmation of this fact for two outputs makes this relationship believable (the reasons for which have already been given in our discussion of the appropriate single-output empirical model).

However, there is also a new, important factor negatively affecting the combined efficiency of publishing and implementation – the scientific activity carried out by a given unit in the field of medical and health sciences. For this factor, conducting research in agricultural and veterinary sciences as well as humanities did not significantly impact the institutes' combined efficiency¹⁶.

6. Conclusions and Directions for Further Research

The study shows that changing the category in the empirical model improved the credibility of the results, compared to the previous analysis in (Brzezicki & Prędko, 2023b). However, due to the limited data available, it was necessary to limit the study to the group of PAS institutes.

A significant share of institutes – almost half and one-third of the units for publishing and total efficiency (publication and implementation), respectively – were highly inefficient (exceeding the value of 1.5).

This is primarily because many institutes conduct activities unrelated to research and development, a fact confirmed by the results of the SAO inspection mentioned in the introduction to the paper. Secondly, the analysis did not include all the effects of research and development activities (e.g. expert opinions, reports and analyses) due to the lack of access to relevant data. This may also have had a negative impact on the efficiency of institutes that generate such outputs.

The institutes' publishing efficiency was negatively affected by the research conducted by a given unit in the field of agricultural and veterinary sciences, and positively by the implementation of scientific research in the humanities.

This is because the institutes conducting research in agricultural and veterinary sciences tend to conduct experimental research, which may lead to reports, analyses and reports on these studies, but not necessarily publications, being generated. On the other hand, it seems natural that units conducting research in the humanities would generate numerous publications.

At the same time, these factors did not have a significant impact on the combined efficiency, which is negatively affected by the scientific activity carried out by a given unit in the field of medical and health sciences. This too seems natural: it is an area where both publications describing the results of medical research and experiments, as well as patents related to new drugs and medical devices, play a significant role. However, why this impact is negative remains a pressing question.

¹⁶ These factors were significant for the results obtained for publication efficiency.

The results of the present study indicated that the higher (better) the scientific category of an institute, the lower (weaker) its level of efficiency in the two aspects analysed. This is probably because a higher scientific category is awarded for the higher quality of publications rather than their number. Hence, it would be advisable in the future to obtain data on the total number of points for publications obtained by institutes in a given period.

Finally, this study has limitations that suggest certain prospects for further research. Firstly, the study analysed only one group of research institutes from among three that currently operate in Poland (Brzezicki, 2022; Brzezicki & Prędko, 2023b). Secondly, a dynamic analysis has not been performed for more than a year. This made it impossible to analyse changes in efficiency (and more broadly, productivity) which may have grown out of changes in the science and higher education system and legal and organisational changes in individual institutes¹⁷.

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Authors' Contribution

The authors' individual contribution is as follows: Each contributed 50%.

Conflict of Interest

The authors declare no conflict of interest.

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Participation in Online Social Network Groups as a Driver of Sustainable Behaviour

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ABSTRACT

Objective: The study investigates the relationship between engagement in two large English-language online communities on Facebook and Reddit dedicated to sharing green-living tips and promoting sustainable behaviour among their members.

Research Design & Methods: The proposed conceptual framework assumes that the impact of social media engagement on sustainable behaviour change is mediated by intrinsic and extrinsic motives for sustainable behaviour, as well as moderated by homophily (reflecting perceived similarity between an individual and other group members). The model also accounts for time as a social group member and personal characteristics of respondents, including gender, age, income and education. The statistical methods involved structural equation modelling with SmartPLS.

Findings: The findings indicate that participation in online communities leads to favourable changes in attitudes and behavioural patterns. The strength of this association is positively moderated by homophily. Females and research participants who were younger and more affluent reported greater numbers of changes in their behaviour.

Implications/Recommendations: The outcomes of this study can help NGOs, businesses maintaining online brand communities and government policymakers understand how to successfully promote sustainable behaviour through measures aimed at relationship building.

Contribution: This research adds to the theory of marketing communication extending the knowledge about the role of social media in influencing consumer behaviour.

Article type: original article.

Keywords: sustainable behaviour, online communities, social media, homophily.

JEL Classification: D64, M10, N30.

1. Introduction

Sustainable development has emerged as a prominent mainstream notion in both science and the economy. Due to its high impact on the environment, the reduction of waste and emissions stands as an important principle of sustainability, which could be furthered not only by the government and business but also by individuals (Daly, 1990). As such, promoting behavioural changes among consumers toward more sustainable lifestyles is a viable contribution to sustainable development. It has been shown that the major obstacles to individuals adopting more sustainable behaviour are the perception of increased expense, a lack of interest, and ignorance (Kollmuss & Agyeman, 2002; Deloitte, 2022). In this context, Internet-enabled social media (SM) could serve as an effective means of enhancing knowledge and interest in sustainable living.

SM has become one of the most impactful communication channels, offering its users different forms of interacting within their communities, ranging from passive ways (like reading posts and approving other users' content) to more active kinds of engagement involving creating their own content and holding conversations with fellow community members (Onofrei, Filieri & Kennedy, 2022). Sustainably conscious consumers, who are highly engaged within their online social networks, can disseminate information on sustainability, raise awareness and protect nature in general (Groth, Buchauer & Schlögl, 2018). Furthermore, research shows that SM can influence consumers' perceptions, attitudes, and intentions (Narangajavana *et al.*, 2017; Dwivedi *et al.*, 2021). Interestingly, despite this considerable potential, organisations entrusted with promoting sustainability continue to underperform on SM (McAllister-Spooner, 2009; Carpenter *et al.*, 2016).

In this research, we aim to investigate the links between SM engagement and sustainable behavioural change among members of two large international online communities on Facebook and Reddit. Our research seeks to discover how much behavioural patterns can change because of one's participation in a sustainability-focused SM group and to identify determinants that correspond to greater or

smaller changes, including homophily, intrinsic and extrinsic motives, time spent as a member of a social group, and personal characteristics. To the best of our knowledge, this is the first study to directly investigate this research problem based on original empirical data collected from SM users. Accordingly, we not only address a gap in the theoretical knowledge, but we also provide practical recommendations for businesses, NGOs, as well as governmental bodies, looking to improve the effectiveness of their marketing efforts by relying more on social media channels.

This paper is structured as follows. First, we develop research hypotheses by reviewing pertinent literature sources. Next, we provide a detailed description of the research methods employed, to be followed by a presentation of the research results. The last section discusses the findings, conclusions, limitations and directions for further research.

2. Literature Review

The concept of sustainable development, understood as the “progress that satisfies the needs of the present without endangering the ability of future generations to satisfy their needs” (Stahlmann, 2008, p. 59), gained prominence in the second half of the 20th century. At that time, actions were taken on the global stage to improve the quality of life of societies in a clean natural environment. Because of its high environmental impact, reducing waste and emissions is a key tenet of sustainability that may be advanced by individuals (Daly, 1990). As such, encouraging consumers to adopt more sustainable lifestyles can contribute to sustainable development.

Internet-based SM has emerged as a powerful channel of communication across the globe and its extensive use has altered the ways in which people interact online. Today’s users of SM can directly interact with peers, build communities, and target people in their individual interest spaces (Carim & Warwick, 2013; Carpenter *et al.*, 2016). Hence, information sharing and interaction is accomplished with exceedingly low cost and effort.

Engagement is a key concept in exploring consumer usage patterns of SM that characterises the scope and intensity of passive and active forms of involvement with online communities (Amaro, Duarte & Henriques, 2016). Higher levels of engagement entail relationship building with users through direct dialogue, while less engaged individuals can limit themselves to just reading posts and interacting with other users’ content by clicking like buttons on Facebook and Instagram, or upvoting on Reddit. SM groups tend to be developed around certain topics (Carpenter *et al.*, 2016), with sustainability focused communities frequently formed around environmental activism (Pickerill, 2001) with the purpose of limiting the negative environmental and societal impacts of their members (Kollmuss & Agyeman, 2002).

Past research has found that one of the main reasons for people not acting in a sustainable and responsible way is a lack of understanding of their negative environmental and social impacts (Kollmuss & Agyeman, 2002). Consequently, greater engagement in sustainability on SM could lead to raised awareness of sustainability issues, inducing positive behavioural changes (Stieglitz & Dang-Xuan, 2013). Furthermore, SM messages tend to be more effective at influencing knowledge, attitudes, and behaviour towards the environment than traditional media (Naranga-javana *et al.*, 2017; Dwivedi *et al.*, 2021). As Groth, Buchauer and Schlögl (2018) observe, SM provides excellent opportunities for communication and interaction through online communities, and judicious use of such platforms can increase people's adoption of more sustainable behaviour.

To assess the effectiveness of online group participation in fostering sustainability, this study examines the impact of users' SM engagement on the development of their behavioural intentions towards more sustainable behaviour. Thus, we propose the following hypothesis:

H.1. Social media engagement is positively associated with sustainable behaviour change.

According to self-determination theory – SDI (Deci & Ryan, 1985, 1991), different types of motivation can be distinguished with respect to the level of self-determination underlying the behaviour. These motivational subtypes can be classified into three broad categories: intrinsic motivation, extrinsic motivation (Minton *et al.*, 2012; Salonen *et al.*, 2014; Pilgrimiené *et al.*, 2020) and amotivation (Pelletier *et al.*, 1998).

SDI (Deci & Ryan, 1985) has been applied in many domains, including predicting intentions to engage in pro-environmental behaviour (e.g., Grønhoj & Thøgersen, 2017). Intrinsic motives refer to motivations that come from within the individual, such as personal values, beliefs, and attitudes. These types of motivations are often associated with a sense of personal responsibility and a desire to make a positive impact on the environment. Past research indicates that individuals with strong intrinsic motives are more likely to engage in sustainable behaviours such as recycling, energy conservation, and reducing consumption (Kollmuss & Agyeman, 2002).

Extrinsic motives, on the other hand, refer to motivations that come from external factors such as social norms, incentives, and rewards, often related to compliance with regulations, laws, or social expectations, all of which are connected with reward or punishment. The goal of a behaviour governed by extrinsic motives is to bring about positive consequences or to avoid negative ones (Deci, 1975). Studies have shown that individuals with strong extrinsic motives are more likely to engage in sustainable behaviour if they are rewarded or if there is a perceived social pressure to do so (Kollmuss & Agyeman, 2002).

Research also points out that combining intrinsic and extrinsic motives can have a stronger effect on sustainable behaviour than either kind alone (Thøgersen, 1999; Stern, 2000). It is therefore important to recognise that intrinsic and extrinsic motives are not mutually exclusive, both can coexist and interact in individuals and may influence sustainable behaviour differently depending on the context.

There is a growing body of research suggesting that SM engagement is positively associated with intrinsic and extrinsic motives for sustainable behaviour. Hasbullah, Sulaiman and Mas'od (2020) developed a conceptual model, which posits that sustainable consumption of luxury fashion can be driven by user-generated content in social media through both intrinsic and extrinsic motives. In their, as yet empirically untested model, intrinsic motivations are shaped by self-acceptance and community feeling, while extrinsic motivations are related to perceptions of fame and the credibility of the endorser. In a survey of 341 visitors to Vietnamese destinations, Chi (2021) discovered that SM can drive consumption intention in ecotourism through a mediation effect of intrinsic and extrinsic motivations. Xie and Madni (2023), based on a poll of 303 young Chinese consumers, observe that information sharing on social media is positively associated with green purchase intentions with subjective norms serving as an intermediary in this process. The subjective norms variable was operationalised as Likert scale statements about external influences, making this construct similar to extrinsic motivations. Research conducted by Yoo and Gretzel (2011) showed that consumers using SM before taking a specific action, often do so to enjoy the activity and they are driven mainly by intrinsic motives such as pleasure and enjoyment.

These studies provide evidence that SM engagement can positively influence intrinsic and extrinsic motives for sustainable behaviour through the provision of information, social norms, social identity and social comparison. At the same time, it is reasonable to expect positive links between both types of motives and sustainable consumption, which is one aspect of sustainable behaviour. Therefore, we hypothesise that:

H.2. Social media engagement is positively associated with intrinsic (H.2.1) and extrinsic (H.2.2) motives for sustainable behaviour.

H.3. Intrinsic (H.3.1) and extrinsic (H.3.2) motives for sustainable behaviour mediate the relationship between social media engagement and sustainable behaviour change.

A key idea in the conceptual framework of this study is homophily, which explains group composition in terms of the similarity of members' characteristics and the extent to which "pairs of individuals who interact are similar with respect to certain attributes such as beliefs, values, education, social status, etc." (Rogers & Bhowmik, 1970, p. 526). Similarly, SM homophily refers to the tendency for individuals to form connections with others who are like themselves on SM plat-

forms. Homophily has an impact on interpersonal relationships both off- and online, but it is assumed that on the Internet, homophily matters more. Internet users tend to have a more favourable impression of people whom they find similar to themselves and are more likely to make an effort to stay in touch with them, learn about their activities, and follow their posts (Ayeh, Au & Law, 2013; Shan, 2016; Filieri *et al.*, 2018; Onofrei, Filieri & Kennedy, 2022).

Research suggests that homophily can be positively associated with SM engagement and can moderate the relationship between SM engagement and various outcomes, including motives for sustainable behaviour and sustainable behaviour change. This means that people who feel a greater affinity with other members of an online community tend to spend more effort and time in that community, more carefully reading social group posts, checking for updates and being more likely to create their own posts on the community forum (Mouw, 2006). Accordingly, we make the following hypothesis:

H.4. Social media homophily is positively associated with social media engagement (H.4.1), and is moderating the relationship of social media engagement with motives for sustainable behaviour (H.4.2) and with sustainable behaviour change (H.4.3).

Additional relevant considerations are personal characteristics of social group members as well as the length of time a person was a SM group member. The time variable could be thought of as a proxy for accumulated experience that a user has acquired with an online community. Increased experience could plausibly be assumed to coincide with a stronger feeling of affinity with other group members, increasing the group's cohesion and leading to more profound behavioural changes induced by the group (Zaglia, 2013). Also, the longer the membership experience in an online community, the stronger the community's cumulative effect on the individual. The literature also hints at the existence of diminishing marginal effects of membership duration on engagement in online communities (Vohra & Bhardwaj, 2019). Thus, it is reasonable to anticipate a positive correlation between the time variable and sustainable behaviour change.

The literature is unclear about the significance of relationships between personal characteristics and social network impact metrics. However, considering that most other studies on the effects of SM on human behaviour controlled for such variables, it is prudent to also include them in our model. But, due to the ambiguous nature of these associations, we will refrain from specifying their directionality. Based on the above reasoning, we may propose the two final hypotheses:

H.5. Time spent as a member of the social media group is positively associated with sustainable behaviour change.

H.6. Sustainable behaviour change is associated with personal characteristics, including gender, age, income, and education.

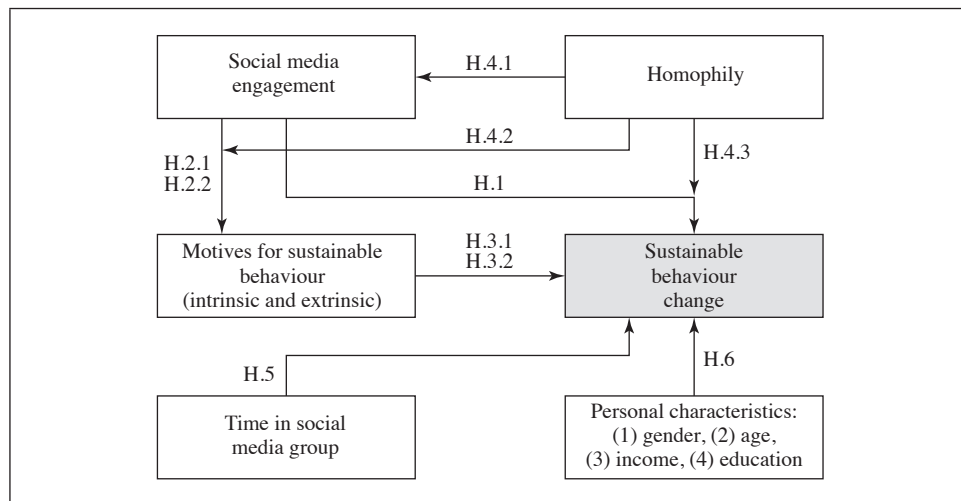


Fig. 1. Conceptual Framework of the Study and Its Research Hypotheses

Source: the authors.

To provide a concise overview of the scope of the current study, the research hypotheses are presented graphically in Figure 1.

3. Research Methods and Collected Sample

The digital questionnaire used in this research included four reflective constructs (homophily, intrinsic motives, extrinsic motives and income) and two formative ones (SM engagement and sustainable behaviour change). Unless indicated otherwise, the questionnaire employed Likert scales with six response options.

The scale for SM engagement was adopted from Amaro, Duarte and Henriques (2016), Onofrei, Filieri and Kennedy (2022), Baldus, Voorhees and Calantone (2015) and Paruthi and Kaur (2017). It included 11 items such as “I use this Facebook/Reddit group to read about the experience of others” and “I interact with others in this Facebook/Reddit group to share tips and experience”. Homophily was measured similarly to Filieri *et al.* (2018), Money, Gilly and Graham (1998) and Onofrei, Filieri and Kennedy (2022) with five items (e.g., “The people in this Facebook/Reddit group have similar likes/dislikes as I do” and “The people in this Facebook/Reddit group have the same values as I do”).

Metrics for intrinsic and extrinsic sustainable behaviour motives encompassed eight and seven items, respectively, sourced from Pelletier *et al.* (1998), Grønhøj and Thøgersen (2017), Clary *et al.* (1998) and Li *et al.* (2018) (e.g., “Taking care of the environment makes me feel better about myself” and “I like the recognition I get from others when I take care of the environment”).

Sustainable behaviour change was measured with a list of 24 statements (Ajzen, 1991; Pelletier *et al.*, 1998; Tanner & Wölfling Kast, 2003; Minton *et al.*, 2012; Salonen *et al.*, 2014; Pilgrimienè *et al.*, 2020) describing a broad range of sustainable activities (e.g., “I try to throw away as little food as possible” and “When available, I take public transport rather than driving my own car”); respondents were asked to indicate if their involvement in respective actions increased, decreased or stayed about the same since joining the SM group.

The data were collected with the CAWI method in December 2022 from two international, English-speaking online communities committed to promoting sustainability and sharing tips on eco-friendly lifestyles:

- r/sustainability – a Reddit group with 353 thousand members ($n = 171$),
- Sustainable Living – a Facebook group with 134 thousand members ($n = 146$).

Invitations to participate in the study were published as highlighted posts, so that every member visiting the groups’ sites was able to easily see them and had a chance to click the provided link and fill out the questionnaire.

In total, 317 usable responses were gathered. The characteristics of the sample are presented in Table 1.

Table 1. Characteristics of the Study Sample

Gender	Age	University Diploma	Number of Sustainable Behaviour Changes
Males: 23.03%	18–24: 16.72%	Yes: 40.06%	0: 5.99%
Females: 76.97%	25–34: 36.28%	No: 59.94%	1: 21.77%
	35–44: 18.61%		2: 27.76%
	45–54: 15.46%		3: 21.14%
	55–64: 10.09%		4: 16.09%
	65+: 2.84%		5: 4.42%
			6: 1.58%
			7: 1.26%
Time Spent as a Member of This Social Group	Income Means for Likert Items Scaled from 1 (Strongly Disagree) to 6 (Strongly Agree)		
< 1 month: 4.42%	1. I could easily handle an unexpected expense of \$300: 3.6		
1–3 months: 8.83%	2. I can enjoy my life because of the way I’m managing my money: 4.1		
4–6 months: 18.30%	3. Because of my money situation, I feel like I will never have the things I want in life: 2.3		
7–12 months: 24.61%	4. I have money left at the end of the month: 4.3		
1–2 years: 23.97%			
2–3 years: 16.09%			
> 3 years: 3.79%			

Source: the authors.

Statistical analysis involved estimating a PLS structural equation model with the SmartPLS 4.0 software.

4. Research Results

To validate the quality of the structural equation model estimated for this study, we looked into standard reliability and validity metrics, as recommended by Hair *et al.* (2018). All relevant metrics came at acceptable levels, with each reflective construct explaining more than 50% of variance in its indicators, which suggests good reliability (Hair *et al.*, 2007, p. 605), and correlating more strongly with their indicators than with other constructs in the model, which satisfies the Fornell-Larcker criterion for discriminant validity (Fornell & Larcker, 1981). Due to editorial limitations in this article, we are unable to provide specifics of this analysis, but interested readers may acquire them from the authors.

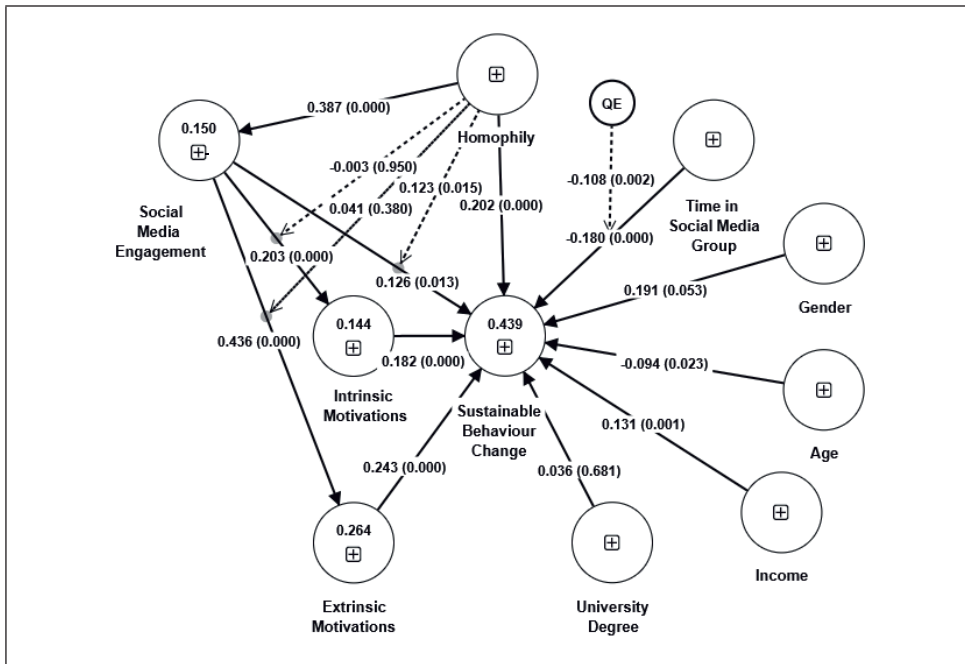


Fig. 2. Standardised Regression Weights and *p*-values for the Study’s Structural Equation Model
Source: the authors.

After verifying the validity of the SEM solution’s measurement model, the inner model illustrating connections between latent variables may be investigated. Figure 2 assists in that by providing standardised regression weights and *p*-values obtained with a bootstrap procedure based on 5,000 subsamples. The values inside the circles represent the amounts of variance in respective endogenous variables explained by the model.

Table 2 complements Figure 2 by presenting information about total effects between variables in the model, where they were different from their direct links, accounting for all relevant mediation effects.

Table 2. Direct and Total Effects between Pairs of Variables in the Model

Regression Paths	Direct Effects		Total Effects	
	standardised regression coefficients	<i>p</i> values	standardised regression coefficients	<i>p</i> values
SM engagement → sustainable behaviour change	0.126	0.013	0.269	0.000
Homophily → extrinsic motivations	0.138	0.009	0.307	0.000
Homophily → intrinsic motivations	0.252	0.000	0.330	0.000
Homophily → sustainable behaviour change	0.202	0.000	0.385	0.000

Source: the authors.

Figure 2 shows that the structural equation model explains 43.9% of the variance in sustainable behaviour change (SBC), with almost all hypothesised predictors (save the university degree variable) having significant contributions. Standardised regression coefficients for total effects listed in Table 2 indicate that the three strongest determinants of SBC are homophily (0.385), SM engagement – SME (0.269) and extrinsic motivations (0.243).

As was anticipated, SME does indeed show positive effects on SBC, both through direct links and due to the mediation of intrinsic and extrinsic motivations. Interestingly, the regression path involving extrinsic motivations is stronger than the one observed for intrinsic motivations, which may be because participation in online communities induces social pressures that tend to boost external, rather than internal behavioural drives. These insights give clear support to H.1 and H.2 of the research hypotheses.

Both groups of motives are positively associated with SBC, with extrinsic motives having a greater effect than intrinsic ones. Given that SME is positively associated with both types of motivation, two significant regression paths are formed, leading from SME to SBC. This is evidence for a partial mediation because SME also connects directly with SBC in a statistically significant way. Thus, hypotheses H.3.1 and H.3.2 can be accepted as true.

The role of homophily in the conceptual framework proved to be more important than anticipated. It was positively correlated with SME, implying that people who feel affinity with other community members are inclined to be more committed and involved. Furthermore, homophily was found to positively interact with the relationship between SME and SBC in line with this formula: $SBC = (0.126 + 0.123 * \text{homophily}) * SME$. Given that latent variables in the model are standardised

(the mean = 0, the standard deviation = 1), one standard deviation increase in homophily nearly doubles the average strength of the correlation between SME and SBE. Also, higher than average levels of homophily are apt to strengthen the link from SME to SBE, while homophily that is less than the mean weakens this association. In addition to its moderating function and indirect links with SBC, homophily has a direct positive impact on how much respondents change their behaviour to be more sustainable and environmentally friendly. All in all, homophily turned out to be the most important contributing factor to behavioural change. The above-described findings corroborate hypotheses H.4.1 and H.4.2. On the other hand, the lack of a significant moderation for the relationship between intrinsic and extrinsic motives and SBC disproves H.4.2.

The significant negative regression coefficient of the second order polynomial for time spent as a community member implies that the relationship between time and SBC is not linear but quadratic, of a form akin to the upside-down letter “U”. As such, the greatest average values of SBC are expected from people with neither too short nor too long experience in the online community. This partially validates H.5, since the positive relationship was established from the lowest values of time to its intermediate levels, where it changes its direction to negative.

Most of the respondents’ individual characteristics turned out to be significant predictors of SBC, which partially supports H.6. In particular, younger and more affluent people were inclined to report more adjustments in their behaviour toward sustainable and environmentally-friendly living. Females revealed more changes than males, but it should be noted that this effect was rather weak, significant only at the 10% level. Interestingly, educational attainment, distinguishing only between those who held or did not hold a university degree, did not show any relationship with SBC.

5. Discussion, Limitations and Directions for Further Research

In this research, we set out to investigate the link between participation in SM and behavioural changes in individuals involving the adoption of more sustainable practices and eco-friendly lifestyles. Based on data from 317 interviews with members of two large international communities on Reddit and Facebook, we found evidence suggesting a positive correlation between SM engagement (SME) and sustainable behaviour change (SBC). In addition to a direct link between SME and SBC, there was a mediation effect of extrinsic and intrinsic motives and a positive interaction with homophily, which describes how strongly respondents felt that their fellow members in the focal SM groups had similar likes, dislikes, and other pertinent attributes. Of the two types of motivations, extrinsic motives were the stronger mediator, as they displayed stronger correlations than intrinsic motives with both SME and SBC. This observation sheds some light on the possible under-

lying mechanism that induces behavioural change; it seems that SM participants are more driven by how their actions are perceived by other community members than by their own personal values and considerations. Furthermore, a significant positive relationship between extrinsic and intrinsic motivations implies a causal link whereby external factors may shape internal reasons to follow principles of sustainability in one's own life.

Of all the determinants of SBC considered, homophily was revealed as the most prominent one. This corroborates the literature sources noting that it plays a significant role in the formation and dynamics of SM groups, influencing both the composition of the group and the types of interactions that take place within it (Halberstam & Knight, 2016; Khanam, Srivastava & Mago, 2023). The current study appears to support the observation by Ertug *et al.* (2022) that homophilous group members are exposed to similar ideas and perspectives, which make them more entrenched in the views accepted by the group and less open to alternatives. Overall, our research suggests that homophily can affect behavioural changes in members of SM groups by influencing the level of engagement, participation, and communication among group members.

One interesting finding is a negative quadratic relationship between time spent as a group member and SBC, with the strongest behavioural changes reported by members with moderate experience in their online community. This could be taken as evidence for the existence of diminishing positive marginal effects on one's behaviour from participation in SM groups.

The apparent lack of effect of education on SBC does not necessarily mean that educational attainment is unimportant. In our study, this variable distinguished only between those with and without a university degree; if we have asked about years of completed formal education instead, perhaps an effect would be revealed in the bottom part of the scale. This should be treated as one of the limitations of this study. Other personal traits significantly contributed to the variance explained in SBC by the model. Accordingly, greater behavioural changes were associated with females rather than males, as well as younger and more affluent individuals.

Our findings provide recommendations for socially-minded businesses and NGOs dedicated to promoting sustainability as to how to enhance the effectiveness of their marketing activities targeted at Internet users. Specifically, we demonstrate that developing cohesive social communities can serve as a potent tool for fostering behavioural changes. However, the main condition of success seems to be the level of homophily that social group members feel about each other; low levels of homophily can result in a lack of behavioural effects or even in behavioural patterns contrary to those anticipated (through the revealed interaction of homophily with the link between SME and SBC).

The study has several noteworthy limitations. First, we lack statistical evidence to assert that our conclusions can be extrapolated beyond the two social media groups investigated. Although these groups were among the largest sustainability-oriented communities on the Internet, further research incorporating a sample from a broader population is essential to enhance the external validity of our results. Moreover, our conceptual model could benefit from the inclusion of additional constructs that might more effectively elucidate the observed statistical associations. Most critically, future research should investigate the direct correlational relationship between social media engagement and sustainable behaviour change. This suggests the existence of mechanisms that foster behavioural change, distinct from the regression pathways mediated by intrinsic and extrinsic motivations. It is conceivable that intermediary variables between SME and SBC exist, which could deepen our comprehension of the mechanisms causing individuals to shift towards more sustainable lifestyles. Additionally, considering SME's significant role in driving SBC, further academic inquiry is necessary to understand the factors that promote or impede involvement in SM, beyond homophily, which was the sole antecedent of SME examined in this study.

Authors' Contribution

The authors' individual contribution is as follows: Each contributed 50%.

Conflict of Interest

The authors declare no conflict of interest.

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Social Capital and the Competitiveness of Logistics Enterprises in the Post-pandemic Era of Society 5.0

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ABSTRACT

Objective: The aim of the article is to identify and determine the importance of social capital markers relevant to logistics companies in the face of ecosystem challenges, as well as to recommend pro-competitive activities of the industry in the context of building a Society 5.0. The authors hypothesised that the identification of a set of social capital markers collected in the

form of a model may become an instrument supporting the management of a logistics enterprise in line with the Society 5.0 trend.

Research Design & Methods: In the research process, a nomothetic approach was used based on the mixed research strategy. The qualitative approach included the method of ethnomethodology with the analysis of available publications, reports and netographic sources. The technique of semantic analysis, the coexistence of terms and the publication suitability of sources were used. On the other hand, the quantitative approach was based on the diagnostic survey method with the CAWI online survey technique.

Findings: The conducted research shows the need to ensure the well-being of employees and the development of their competences, especially digital ones in the context of work technologisation, implementation of innovative technological solutions in the logistics industry. Employees of logistics companies notice that digital competences are the element that affects the efficiency of their work, and this again translates into the company's competitiveness.

Implications/Recommendations: The authors recommend actions by the logistics industry that will be aimed at increasing the share of expenditure on the development of social capital by caring for the well-being of employees, developing their talents, competences and skills. A simplified model of the identification of social capital markers in logistics enterprises may be a helpful management instrument in this respect.

Contribution: Social capital is of significant importance for the competitiveness of logistics companies in the post-pandemic era of Society 5.0. A high level of trust and cooperation among employees, suppliers, and customers can contribute to more efficient functioning of logistics companies. Social capital can be a key factor in enabling logistics companies to quickly adapt to changing market conditions. Building strong relationships with business partners can bring benefits such as better coordination of activities, greater flexibility, and faster responses to market changes. Investing in the development of social capital can contribute to increasing the competitiveness of logistics companies and lead to their success in the post-pandemic era of Society 5.0.

Article type: original article.

Keywords: social capital, logistic enterprises, competitiveness, Society 5.0.

JEL Classification: J24, L90, M12, O33, O34.

1. Introduction

The contemporary business environment in which organisations operate poses a number of challenges for organisations. This, in turn, makes it necessary to search for, diagnose or define tools supporting an effective management system and, consequently, building organisational success. The competitiveness of companies requires modifying models, tools or techniques of management within the organisation so that it can effectively cooperate with the external environment. The increasing awareness of managers, in view of the necessity to use alternative mechanisms supporting the monitoring of organisational processes, led to the appreciation of the

role of social capital. It has become a tool supporting strategic business decisions. The growing importance of social capital for effective management influenced the interest in this subject and contributed to the writing of this article.

The main purpose of the presented material is to describe the importance of social capital in the organisation, to indicate the need to build social capital on the example of companies from the logistics industry and to recommend activities that may determine the competitiveness of logistics companies in the context of building a Society 5.0. The article consists of two parts: theoretical, which was created using a qualitative method in the form of secondary analysis of existing data, and empirical – created using a quantitative method, the tool for which was a questionnaire.

2. Shaping Competitiveness and Social Capital

Growing competition, as well as changes taking place in the operating conditions of modern logistics companies and their dynamics, are the cause of intensification in the processes of searching for factors which contribute to market success. The key to achieving a long-term competitive advantage may be the growing interest in the scientific literature indicating the human factor as its source (Knežević, Naletina & Damić, 2016, pp. 171–187). In addition to the significant role of human capital, i.e. the knowledge and skills of employees, more and more attention is paid to relations between colleagues and their interactions, i.e. social capital. The effect of social capital is the diversification of the level of economic development of both enterprises and economies (Czapiński, 2015, p. 351).

The first use of the term “social capital” is attributed to Hanifan, who conducted research on rural communities. “Neighbourly cooperation based on good will, partnership, sympathy and social bonds between individuals and families (social unity), leads to cost reduction, facilitates the production of goods, and generates income” (Hanifan, 1916, p. 130). Social capital is “the set of actual and potential resources associated with having a permanent network of more or less institutionalised relationships based on mutual knowledge and recognition – or in other words, with membership in a group – that provides each of its members with the support in the form of capital appropriate for collective” (Libertowska, 2018, p. 104). The factors of social capital in an enterprise are relations, norms and values, as well as the ability of members of a given company to cooperate. The *sine qua non* condition for building and effective operation of social capital is trust, which determines the development of the above-mentioned structures. In the literature on the subject, trust is most often interpreted as one of the components of social capital, and sometimes as its consequence (Libertowska, 2018, p. 105). Referring to this, one can also distinguish between internal and external social capital, where internal social capital is a set of real and potential resources that come from the network of relations within the company (Ozanne *et al.*, 2022, pp. 116–135). Properly shaped

social capital becomes a source of innovation, entrepreneurship, competitiveness and sustainable development. These features shape Society 5.0. It is “a proposal for the concept of a modern, forward-looking and human-centred society, in which the integration of cyberspace and the real world is to be implemented using the latest technologies, such as artificial intelligence, the Internet of Things, robotics and big data” (du Vall, 2019, p. 22).

Competitive advantage is the aggregation of various positions, which differentiates companies from their competitors and ensures a unique and strong position in the market (Udriyah, Tham & Azam, 2019, pp. 1419–1428). In order to build a competitive advantage, enterprises must have unique competences and strategic resources that create the highest value for the client and the enterprise (Talaja *et al.*, 2017, pp. 583–604; Dyduch *et al.*, 2021; Cao, Lin & Zhou, 2022; Dang & Wang, 2022). To this end, companies must both strengthen internal cooperation and organise integration mechanisms between various entities, pointing to the importance of both internal and external social capital (Ozanne *et al.*, 2022, pp. 116–135).

Creating a competitive advantage in the modern economic reality is an extremely difficult task, because the determinant of competitiveness is not only the services offered by enterprises, but also social capital, defined as unique and difficult to imitate intangible resources (Ozanne *et al.*, 2022, pp. 116–135). Social capital in enterprises should be based not only on trust in external business partners, but also refer to intra-organisational social relations. In addition to material factors, sources of competitive advantage should be sought in intangible factors. The discovery of the impact of phenomena invisible in the account books on the increase of the value of enterprises has resulted in a significant research revival, but so far it has not been possible to develop a single coherent definition of social capital and its evaluation in the enterprise. The growing awareness and knowledge about the components of social capital and its impact on creating a competitive advantage opens up new horizons for managers in asset management, so that they are more attractive to investors and more competitive in the logistics industry.

3. The Logistics Industry in the Light of Social and Technological Changes

The logistics industry provides support for every economy and helps in achieving the economic goals set. Just like the logistics processes that support a company's operations. Due to its nature and the way it affects other economic entities, the logistics industry responds to market demand by performing those tasks that are crucial for other sectors of the economy at a given moment.

Customers of the logistics industry expect a very quick response to the demand for logistics services, and at the same time they require that all processes take place safely in various contexts. It is about security of supplies, availability of goods, their

protection against physical damage during handling, storage and transport, as well as safety from the point of view of the natural environment. Many of these challenges are also related to the changes that have been observed in the economy in recent years.

The trends that the logistics industry should be ready for are, above all, securing the continuity of supply chains and the predictability of delivery times, the ability to react quickly in a crisis, enabling the tracking of goods in real time, and adapted made-to-measure warehouses enabling a flexible approach to the implementation of logistics tasks. In addition, there is more and more talk about demands coming from customers, but also related to political and legal conditions. The growing importance of a sustainable approach to enterprise development should be taken into account, especially the most energy-intensive ones, which certainly include logistics enterprises. A particular challenge is transport and means of transport. It is mainly about reducing the consumption of fossil fuels, in this case crude oil, and thus reducing exhaust gas emissions to the environment. However, care for the natural environment also includes solutions in warehousing and goods handling services, e.g. through the use of appropriate technologies in the construction of warehouses, the use of renewable energy sources, and appropriate management of internal warehouse processes in order to reduce energy consumption (Carli *et al.*, 2020; Kumar *et al.*, 2022). An additional aspect is the use of modern technologies that enable tracking of all movements of goods, means of transport, as well as real-time analysis of process efficiency. Recent years in logistics have, of course, seen the introduction of Logistics 4.0, but more and more often Logistics 5.0 is a natural next step in the development of the logistics industry.

The issues of digitalisation and the applicability of sustainable solutions make it necessary to look for employees who will also meet these requirements. It is also possible to develop skills and competences among employees. Certainly, one of the biggest challenges will be the employment of specialists who will be able to respond to the demand for digital skills, IT systems management, as well as engineering skills in the field of maintenance of computer-controlled machines and devices. From the point of view of the concept of Society 5.0, these are certainly skills and competences that will enable further development of the industry and increase the competitiveness of logistics companies.

4. Social Capital and the Competitiveness of Enterprises in the Logistics Industry – Research Methods

In order to obtain a full picture of the importance of social capital as a weapon in the competitive struggle of logistics companies, the material obtained from research into literature, publications and reports was strengthened with the results of primary source research. For this purpose, a study was designed and carried

out on the potential of enterprises that can help create market success in the era of post-pandemic challenges of Society 5.0. The purpose of the research was, among other things, to determine the components of social capital.

The CAWI (Computer Assisted Web Interview) “user centric” Internet survey method was used to obtain the material. The research tool was a questionnaire consisting of 17 closed questions, including 10 based on scaling attitudes according to the Rensis Likert scale. Google’s digital platform was used to propagate the study. The study period covered the months of April and May 2022.

Due to the scope of the research, the study was fragmentary and deterministic. The subjects of the study were employees of logistics companies. The general population of all people working in Poland as at December 31, 2020 was 16,555,000 people. The entire population of all people working in Poland was not surveyed, but only those working in logistics in enterprises operating in Poland at the turn of April and May 2022, which is only a part of the general population. In accordance with the procedure, the characteristics of the sample reflecting the surveyed population were quantified, which were: state of residence in Poland and working age (men aged 15–64 and women aged 15–59) and the fact of working in a logistics company or a department dealing with logistics processes. Then, based on the formula, the minimum sample size was determined:

$$n_{\min} = NP(\alpha^2 \cdot f(1-f)) / NP \cdot e^2 + \alpha^2 \cdot f(1-f),$$

where:

- n_{\min} – the minimum sample size,
- NP – the size of the study population,
- α – the confidence level for the results,
- f – fraction size,
- e – assumed maximum error.

Due to the fact that it was not possible to obtain data on the number of people working in the logistics departments of companies other than those included in the Department of Transport and Warehouse Management according to Central Statistical Office, it was assumed that the size of the fraction for both people potentially working in logistics and those not working in logistics out of all employees in Poland as at December 31, 2020 was 0.5, with a random error of 5% and a confidence level of 0.95.

After substituting the assumed numerical values into the formula, the result was obtained $n_{\min} = 384$, which meant that the minimum number of units that needed to be surveyed was 384 people. To obtain the research material, the method of non-random selection of units typical for the test with the snowball technique was used. To this end, on selected social networking sites on logistics, a request was made to all persons meeting the conditions of the survey participant, defined by the

characteristics of the studied sample, to take part in the survey by clicking on the link that took them to the Google platform, where the questionnaire was placed.

It took about 10 minutes to complete the questionnaire. The collected research material in the form of raw data was coded and statistically analysed using the SPSS programme (Statistical Package for Social Sciences). The process of analysing the collected material consisted of three stages.

In the first stage, the collected material was verified and aggregated. The distribution of the obtained variable values was presented in the form of tables and charts.

Then, in the second stage, where it was possible and made sense in statistical terms, cross-comparisons were made between the independent variables of the community description and the dependent variables. Cross statements of two variables were each time visualised in the form of contingency table. The table consisted of r rows and s columns each time. Each row and column corresponded to particular variants of the feature X and Y . The content of the contingency table consists of the n and j numbers of sample elements that have the i -th variant of the feature X ($i = 1, 2, \dots, R$) and the j -th variant features of Y ($j = 1, 2, \dots, s$). Each time the contingency table was the basis for the verification of the null hypothesis (H_0) about the existence of the potential stochastic independence of random variables X and Y and the alternative hypothesis (H_1), adopted in the case of rejecting the null hypothesis (H_0) according to the formula:

$$H_0: P\{X = x_i \wedge Y = y_j\} = P\{X = x_i\} \cdot P\{Y = y_j\}$$

$$H_1: P\{X = x_i \wedge Y = y_j\} \neq P\{X = x_i\} \cdot P\{Y = y_j\}$$

Each time the assumption about the existence of a relationship between the variables was verified with a statistical test on the independence of the variables. The basis for the verification of the H_0 hypothesis about the stochastic independence of variables was the value of the statistics obtained from the formula:

$$\chi^2 = \sum_i^r \sum_j^s \frac{(n_{ij} - \tilde{n}_{ij})^2}{\tilde{n}_{ij}} : \chi^2(r-1) \cdot (s-1),$$

where:

n_{ij} – conditional empirical numbers resulting from the contingency table,

\tilde{n}_{ij} – theoretical conditional counts that could appear in the table if the features were independent.

Hypothetical numbers are determined according to the formula:

$$\tilde{n}_{ij} = \frac{n_i \cdot n_j}{N}.$$

In the verification procedure, it was assumed that the rejection area H_0 is always right-handed with a specific significance level $\alpha \leq 0.05$ with the critical values of the distribution χ^2 of $(r-1) \cdot (s-1)$ degrees of freedom. The estimation area covered

$\chi^{2emp} > \chi^{2\alpha}$, where if it was met, the H_0 hypothesis about the independence between the variables was rejected in favour of the H_1 hypothesis indicating the existence of a relationship between the features.

The limitations of the study were the lack of a sufficient budget to test a larger number of people, the lack of access control and the research method used in the implementation. Due to the fact that there was no sampling frame, the questionnaire could not be sent to specific persons. Such a situation could have meant that the answers were given by people who do not work in logistics. In addition, the study was limited by the fact that it only reached people who are responsible for handling e-mail contacts.

5. Results

The result of the analytical work is the presentation of the profile of the studied sample and the basic data relating to the importance of social capital as a potential that can be a weapon in the competitive struggle of logistics companies. It is worth noting, however, that due to the fact that when selecting the units for the sample, the non-random methodology was used, it is difficult to fully assess the representativeness of the obtained material in a statistical sense due to the failure to meet all the requirements of the randomness of research samples. The advantage of the research, however, is the size of the final sample, which speaks in its favour and proves that there are grounds for inference.

The examined sample consisted of 625 units, thus exceeding the necessary minimum size. The respondents participating in the study included both women and men. The vast majority of respondents indicated that they had little experience in logistics. Nearly half of the respondents had worked in the area of logistics for less than 1 year (48%) or from 1 to 3 years (37%). Respondents are most often employed in positions such as: junior specialist (30.4%), specialist (30.4%) or line worker (24%). Few respondents indicated that they were employed as a manager (10.4%), a senior specialist (4%) or belonged to a group of top management employees (0.8%). And due to the area of specialisation in logistics, the respondents most often have roles in the areas of customer service (33.6%), warehousing (22.4%) and shipping (14.4%). The smallest number of people indicated activities in the area of production logistics (8%) or internal transport (6.4%). Most of the survey participants (42.4%) declared that they were employed in companies employing over 250 people. The respondents predominantly (87.2%) worked for private enterprises compared to people working in public enterprises (12.8%).

The vast majority (53.6%) of the respondents represented enterprises operating on an international scale. Due to the specificity of the subject of the study, it was important to specify the significance of logistics in the enterprises represented

by the respondents. And so, every third participant of the study (32.8%) works in a company where logistics is important, with representation in the form of a logistics department. Nearly every third respondent (28%) declared that the company in which logistics works is crucial due to the fact that it is included in the TSL industry. Only one in five respondents (21.6%) admitted that logistics and logistic processes are a secondary function, and one in five (17.6%) reported that logistics is only an area supporting the operations of a company with representation in the form of a logistics unit.

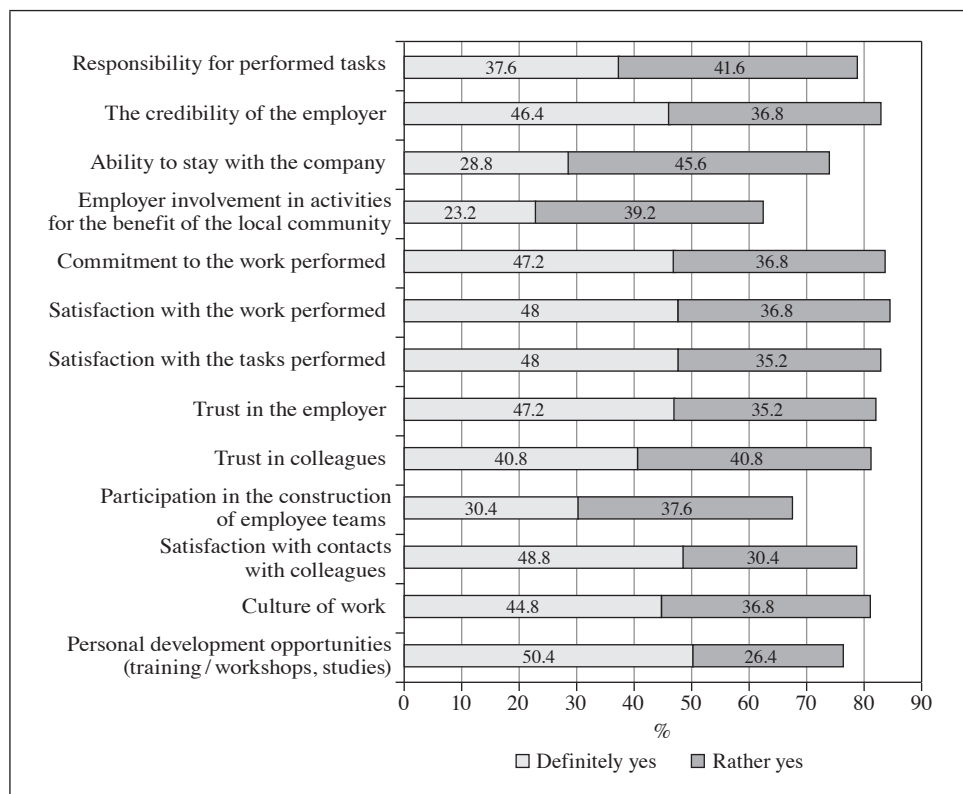


Fig. 1. Significant Components of the Social Capital of Logistics Enterprises in the Era of the Digital Economy

Source: the authors.

In accordance with the mainstream analysis, social capital for logistics enterprises means the possibility of achieving the established goals, which they would not achieve if it were missing, therefore employees of logistics companies appearing in the study as respondents were asked about the components of social capital

that, in their opinion, are important for their enterprises in the era of the digital economy. The selection of the components of social capital (Fine, 2001; Collier, 2002; Molyneux, 2004) for the analysis was dictated by the need to indicate the necessity to combine individual issues important for the individual, i.e. offering self-improvement opportunities by the employer and team opportunities related to the synergy resulting from the functioning of the group, which meant indicating the importance of the quality of interpersonal relations created by the logistics community, including the role and importance of bonds between people working in teams and their commitment to work. Equally important factors of social capital are the credibility and trust of employees in the employer and the ability to stay with the company, which together constitute the preconditions of the individual's involvement in the functioning of the company. The indicated components, both in individual and team terms, as well as in the employee–employer relationship, may intrinsically affect the effectiveness and efficiency of the company's operation, which is why, according to the researchers, it was worth examining these components of social capital.

According to the indications, it can be stated that, for the respondents who are employees of logistics companies, the following are definitely and rather important (Fig. 1): satisfaction with the work performed by employees of these companies (84.80%), their commitment to the work performed (84%) and their job satisfaction (83.20%). Equally important, according to the respondents, is the credibility of the employer. Definitely yes and rather yes, this is confirmed by the majority of respondents (83.20%). In their opinion, trust in the employer (82.40%) and trust in co-workers (81.60%) are also important. Organisational culture plays a special role in this process. This is the opinion of the vast majority of respondents (81.60%). In their opinion, a slightly smaller role is played by responsibility for the tasks performed (79.20%), satisfaction with contacts with colleagues (79.20%) and the possibility of personal development (76.80%).

According to the respondents, the least important components of social capital in logistics companies are the ability to stay with a given company (74.40%), participation in building employee teams (68%) and the employer's involvement in activities for the local community (62.40%).

After analysing the distribution of values of variables that are components of social capital in accordance with the adopted research procedure, the obtained results were compared in terms of experience, position and area of logistics specialisation of the employee in the form of contingency tables. The effect of this action was to indicate the existence of potential relationships between the selected variables, which was verified using the χ^2 test of independence, taking into account V-Cramer (Table 1).

Table 1. Components of Social Capital of Logistics Enterprises in Relation to Experience, Position and Area of Specialisation – χ^2 Test of Independence with the Strength of the Relationship Determined by V-Cramer

Specification	Experience			Position			Area of Specialisation		
	χ^2	<i>p</i>	V	χ^2	<i>p</i>	V	χ^2	<i>p</i>	V
Personal development opportunities (training/ workshops, studies)	78.435	0.001	0.177	299.253	0.001	0.346	250.743	0.001	0.317
Culture of work	72.824	0.001	0.171	221.252	0.001	0.297	180.268	0.001	0.269
Satisfaction with contacts with colleagues	100.663	0.001	0.201	241.414	0.001	0.311	268.490	0.001	0.328
Participation in the construction of employee teams	51.839	0.001	0.144	188.666	0.001	0.275	234.030	0.001	0.306
Trust in colleagues	53.928	0.001	0.147	249.843	0.001	0.316	291.027	0.001	0.341
Trust in the employer	60.698	0.001	0.156	246.737	0.001	0.314	192.664	0.001	0.278
Satisfaction with the tasks performed	58.981	0.001	0.154	202.833	0.001	0.285	289.992	0.001	0.341
Satisfaction with the work performed	89.129	0.001	0.189	176.612	0.001	0.266	170.979	0.001	0.262
Commitment to the work performed	88.049	0.001	0.188	207.390	0.001	0.288	322.042	0.001	0.359
Employer involvement in activities for the benefit of the local community	89.604	0.001	0.189	148.023	0.001	0.243	161.172	0.001	0.254
Ability to stay with the company	78.085	0.001	0.177	181.081	0.001	0.269	168.164	0.001	0.259
The credibility of the employer	66.373	0.001	0.163	127.045	0.001	0.225	135.346	0.001	0.233
Responsibility for performed tasks	101.950	0.001	0.202	186.712	0.001	0.273	210.033	0.001	0.290

Notes: χ^2 – test value, *p* – asymptotic significance, V – relationship strength calculated using V-Cramer. Source: the authors.

The analysis shows that the individual components of social capital indicate connections between them and the characteristics of people working in logistics in terms of experience, position and area of specialisation. The analysis shows that the existing relationships between the individual components of social capital due to their importance in the era of digital economy in relation to selected characteristics of the surveyed community, although they are mostly weak, are significant in a few cases.

The possibility of personal development as a component of social capital is the most important for respondents employed in specific positions and performing tasks in specific areas of specialisation. Organisational culture as a component of social capital is perceived similarly. Satisfaction with contacts with colleagues and trust in colleagues are most strongly related to the degree of specialisation of the work performed. In turn, trust in the employer and job satisfaction are strongly related to the position. On the other hand, satisfaction with the tasks performed, commitment to the work performed and responsibility for the activities performed are most strongly associated with the area of specialisation. The weakest links are visible for such components of social capital as the employer's involvement in activities for the benefit of the local community, the ability to stay with a given company and the employer's credibility. Here, the significance of these factors is independent of the experience, position and area of specialisation of logistics activities carried out by the respondent – an employee of a logistics company.

Similarly, when analysing the relationships between the components of social capital and the characteristics of enterprises, such as the size of the enterprise, the scope of its activities and the place that logistics occupy in its structures, certain relationships can be observed (Table 2). As with the experience, position, and specialisation juxtapositions, they are mostly weak, but in a few cases they are significant.

Therefore, it can be concluded that the possibility of personal development as a component of social capital is the most important for respondents employed in large enterprises, operating on an international scale, operating in the TSL industry or having a logistics department. Organisational culture as a component of social capital is important regardless of the size of the enterprise and its scale of operation. A slightly greater dependence is visible due to the place of logistics in the company's structure. Employees working in companies from the TSL industry or having a logistics department indicate the importance of culture as a more important aspect of an organisation.

Satisfaction with contacts with co-workers is most strongly related to the scope of the company's activities and the size of the company. Especially in local and national enterprises and those employing up to 50 people, this relationship is strong. So is trust in co-workers. In turn, trust in the employer is strongly related to the

Table 2. Significant Components of the Social Capital of Logistics Enterprises in the Era of the Digital Economy in Relation to the Size of the Enterprise, the Scope of Operation of the Enterprise and the Place of Logistics in the Structure of the Enterprise – the χ^2 Independence Test with the Strength of the Relationship Determined by V-Cramer

Specification	Size			Scope of Activity			Place of Logistics		
	χ^2	<i>p</i>	V	χ^2	<i>p</i>	V	χ^2	<i>p</i>	V
Personal development opportunities (training/ workshops, studies)	95.502	0.001	0.276	83.453	0.001	0.258	111.413	0.001	0.244
Culture of work	44.880	0.001	0.189	38.365	0.001	0.175	74.013	0.001	0.199
Satisfaction with contacts with colleagues	47.371	0.001	0.195	72.444	0.001	0.241	46.945	0.001	0.158
Participation in the construction of employee teams	22.616	0.004	0.135	29,044	0.001	0.152	24.937	0.001	0.115
Trust in colleagues	37.267	0.001	0.173	53.361	0.001	0.207	38.586	0.001	0.143
Trust in the employer	59.664	0.001	0.218	44.057	0.001	0.188	59.023	0.001	0.177
Satisfaction with the tasks performed	36.568	0.001	0.171	94.929	0.001	0.276	77.542	0.001	0.203
Satisfaction with the work performed	44.048	0.001	0.188	64.737	0.001	0.228	75.408	0.001	0.201
Commitment to the work performed	91.417	0.001	0.270	84.283	0.001	0.260	42.939	0.001	0.151
Employer involvement in activities for the benefit of the local community	47.486	0.001	0.195	34.146	0.001	0.165	61.035	0.001	0.180
Ability to stay with the company	59.091	0.001	0.217	58.760	0.001	0.217	37.011	0.001	0.243
The credibility of the employer	49.395	0.001	0.199	55.209	0.001	0.210	79.779	0.001	0.206
Responsibility for performed tasks	33.855	0.001	0.165	59.951	0.001	0.219	141.026	0.001	0.274

Notes: χ^2 – test value, *p* – asymptotic significance, V – relationship strength calculated using V-Cramer. Source: the authors.

size of the enterprise and the scope of its operations. The larger the company and whether it operates on an international scale, the more often the indication of the importance of the factor of trust in the employer as an important variable of social capital is visible. The smallest dependence is visible in relation to the place of logistics in the company structure and to job satisfaction. On the other hand, satisfaction with the tasks performed and satisfaction with the work performed is strongly related to the scope of activity and the place of logistics in the structure of the enterprise. The smaller the company (employing up to 50 people), the more important is the level of job satisfaction as a component of the social capital of logistics companies in the era of the digital economy. On the other hand, commitment to work as a component of social capital is related to the size of the enterprise and the scope of its activity. The larger the company (employing over 250 people) and if it operates on an international scale, the greater the commitment to the work performed. Noticeably weaker links are visible for such components of social capital as the employer's involvement in activities for the benefit of the local community, the ability to stay with a given company and the trust in the employer. Here, the importance of these components of social capital is independent of the size of the enterprise, the scope of its operations and the place logistics occupies in its structure.

6. Discussion and Conclusions

Analysing the collected research material, it can be seen that social capital is an important component of shaping relationships on three basic levels: organisation, employees, and society. The collected material, as well as other studies (Al-Omouh, Simón-Moya & Sendra-García, 2020), indicate that this capital becomes a so-called "bridge factor" that affects the building of bonds that are important both inside and outside the organisation, connects people, promotes the exchange of information, stimulates creativity and innovation. It should be emphasised that its accumulation in the organisation allows both the use of existing resources and the establishment of such combinations that create a new dimension of these resources, a new value. This is important in the functioning of modern organisations, especially in highly variable environmental conditions. Social capital is an extension of human capital. Its scope covers human resources and the entire network of connections between them. It points to the positive aspects of interpersonal relations, while highlighting intangible capital as a potential source of strength.

Building social capital as a tool supporting the competitiveness and success of the company requires experienced, committed staff with both appropriate substantive competences constituting a mix of e.g. knowledge, experience, as well as soft ones determining, for example, the level of commitment, cooperation in a team or the ability to reactively adapt to changes. Properly implemented systems dedicated to employees will shape the human potential in the organisation. In turn, its

quality will determine the ability of a holistic organisation to adequately respond to changes, complex working conditions and making key decisions (Zhang-Zhang, Rohlfer & Varma, 2022) that build the organisation's success.

The need to redefine processes is also felt in the logistics industry. It was one of the first areas in which one could observe a very fast pace of change and the necessity of introducing new services, making difficult decisions in a turbulent business environment. This is evidenced by, for example, the transition to logistics management in the traditional sense of logistics processes and supply chain management, by making the solutions offered to customers more flexible (Shoja, Molla-Alizadeh-Zavardehi & Niroomand, 2019), accelerating flexible deliveries through the agility of supply chains (Shashi *et al.*, 2020), and providing resilient supply chains resistant to environmental turbulence (Mu, van Asselt & van der Fels-Klerx, 2021).

The presented research shows that nowadays it is necessary to diagnose the variables affecting social capital and to raise awareness of their importance in management systems both at the micro and macro organisational level. The quality of the social structure, built on the basis of human capital, determines the quality of the tasks performed, and these, in turn, are an important component of building a long-term competitive advantage. This has a big impact on situations inside and outside the organisation. It enables the effectiveness and efficiency of people's actions, cooperation and learning, which leads to the effective use of the competences of employees and managers. Social capital, apart from organisational and business issues, is primarily a social and cultural issue. For this reason, the ability to build a sense of organisational stability and employee involvement requires support from managers in such areas as e.g. trust, a sense of building common moral and ethical principles (Kidron & Vinarski-Peretz, 2024), credibility, transparency of information (Raharisoa & Pezzillo Iacono, 2022), fulfillment of commitments and duties between: employee-organisation-society. It can therefore be said that social capital in relation to human resource management processes is an important category resulting from active participation in organisational relationships that build organisational networks, corporate roles, which, based on the previously indicated variables, enable the staff to access organisational resources, including knowledge and competences.

The described research shows that social capital can be treated as a source of effective social relations in an organisation and can effectively support the functions of human resource management, e.g. in the field of: optimal matching of staff to the current needs of the company, development of employee competences, shaping development paths or effective motivation.

Of course, it should be remembered that incompetent shaping of social capital can also become a source of negative consequences. Distrust, hostility, xenophobia can become the basis for e.g. discrimination, nepotism, cliques, corruption, the

formation of negative connections, or a decrease in efficiency and effectiveness in the process of frequently used business organisation and management systems. They can lower the employee's sense of value, which causes a decrease in commitment, and in willingness to innovate (Adıgüzel & Küçüköğlü, 2021).

It is also worth emphasising that the factors indicated in the research can also be classified as key tools for building an ethical image of an organisation, and this is of fundamental importance for modern business entities (Chinaza Adaobi & Owusuaa-Konadu Snr, 2022).

It can be safely assumed that in the processes of human resources management, effective achievement of desired effects and goals of work and building an authentic community of employees consolidated around the prevailing organisational principles is less and less realistic with a low level of social capital.

The study of social capital in an organisation in the 5.0 economy, in the context of shaping its competitiveness, becomes a necessity. When companies reach a certain threshold of wealth, they start looking for alternative ways to influence their development, and here social capital, which is mainly based on trust, gains key importance. This is of particular importance for industries where creativity in action counts (Ozgun *et al.*, 2022) and care for the environment (Mugoni, Nyagadza & Kuziva Hove, 2023), because the image and contacts with customers depend on it. For this reason, managers should diagnose the variables that build this type of capital, because thanks to this they can choose more effective tools for managing the organisation or develop appropriate models to support them in making strategic business decisions. It should also be emphasised that the analysis of intellectual and relational capital without taking into account social capital is tantamount to placing limitations on the creation of innovation and effective adaptation to changes in the environment.

In the future, the research should be repeated, taking into account the aspects of the impact of social capital on the structure of organisational structures, economic and financial impacts, and the effectiveness of shaping the competitive position of enterprises in the logistics industry. Certainly, such a study of the links between non-financial aspects related to social capital and financial ones in logistics in the era of technology and globalisation can become an important source of information for both practitioners and theoreticians.

Authors' Contribution

The authors' individual contribution is as follows: Each contributed a fourth.

Conflict of Interest

The authors declare no conflict of interest.

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Buying Behaviour of Generation Z with Reference to Cause-related Marketing

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ABSTRACT

Objective: This paper examines the prosocial behaviour among Polish consumers of Generation Z. The impact of cause-related marketing (CRM) campaigns on the purchase intention of Generation Z is studied within the framework of attribution theory and social identity theory.

Research Design & Methods: The research involved 407 individuals who participated in a between-subjects experiment. The experiment had a 2×2×4 design, with factors including product type (hedonic, utilitarian), donation magnitude (small, large) and cause category (environment, health, human-being, animal-welfare). Nonparametric tests were employed to test hypotheses.

Findings: The author finds empirical evidence that Polish Gen Z consumers are willing to buy products linked with social causes. The study further demonstrates the positive effect of consumer personality (attitude toward CRM, attitude toward helping and cause involvement) on CRM participation. The result of this study also shows that there is no direct causal relationship between the product type, cause category and donation size and the purchase intention of Gen Z.

Implications/Recommendations: Marketers should develop CRM campaigns linked with causes that are preferred by Gen Z consumers. In relation to marketing communication, successfully convincing them to purchase cause-related products involves a blend of authenticity and transparency, tangible impact of CRM efforts, social media engagement, and collaboration

with influencers who align with the cause and the values of Generation Z. It can strengthen their altruistic motivation and favourable attitudes toward socially responsible initiatives.

Contribution: Little is known about the prosocial behaviour of Polish Gen Z consumers. This study is intended to reduce this gap. The findings provide an understanding of the importance of consumer-cause identification and attitudes in cause-related marketing campaigns targeting Z consumers.

Article type: original article.

Keywords: Generation Z, cause-related marketing, purchase intention, prosocial behaviour.

JEL Classification: D01, D64, M31.

1. Introduction

Cause-related marketing (CRM) is a crucial strategic marketing tool, one that allows a company to signal its social responsibility and to achieve economic objectives through the participation of consumers in donations. Vrontis *et al.* (2020, p. 594) state that CRM “is the business partnership of a for-profit company with a nonprofit organisation to promote the former’s products and services and, at the same time, raise funds for a worthy cause”. It links company charitable giving with a consumer purchase of cause-related products to help a social cause. Buying such products is a type of prosocial behaviour.

This article analyses the prosocial behaviour of Generation Z (those born between 1995 and 2010). Casalegno, Candelo, and Santoro (2022, p. 1010) argue that Gen Z is more concerned with environmental and social issues than previous generations. Most studies on corporate social responsibility, including cause-related marketing research, focus on the prosocial behaviour of Generation Y (born in the years 1981–1995). However, little is known about how cause-related marketing campaigns affect Generation Z’s purchase intentions, particularly in Poland. Thus, this paper is intended to fill the gap.

The goal of the study is to determine the impact of CRM campaign elements and the personality of Polish Gen Z consumers on their purchase intentions. To help accomplish this goal, the following research questions were posed.

RQ1: Do consumers of Gen Z show prosocial behaviour in the context of a cause-related marketing campaign?

RQ2: Do CRM campaign characteristics – product type, donation size and cause type – determine the willingness of Gen Z consumers to buy cause-related products?

RQ3: Do Gen Z consumers’ psychographic characteristics – attitudes toward CRM campaigns and toward helping others, as well as cause involvement – determine their willingness to buy cause-related products?

The fundamental assumption of the study was that companies bear the cost of donations to social causes. This is the case of costless CRM strategy: in purchasing cause-related products, the buyer incurs no additional costs, expressed in the higher price of such products.

2. Conceptual Background and Hypotheses

2.1. Theoretical Framework

To understand Gen Z consumers' decision-making process regarding cause-related products, this study relies on attribution theory (AT) and social identity theory (SIT). Attribution theory focuses on the question of how individuals explain what they do. Attribution is defined as a psychological, cognitive process used to identify the cause of a certain behaviour (Moharam, Elsamadicy & Negm, 2020, p. 21). In the context of cause-related marketing, attribution theory provides a conceptual basis for examining the attributions made by consumers to CRM campaigns based on both internal (consumer characteristic) and external factors (CRM campaign characteristics) to better understand consumers' responses to a CRM campaign (Kureshi & Thomas 2020, p. 500; Moharam, Elsamadicy & Negm, 2020, p. 21). It is assumed that in the case of positive motivational attribution, there will be a positive behavioural response to CRM initiatives.

Social identity theory holds that individuals identify themselves as a member of a distinct social group, i.e. they place themselves in the same social environment (Tajfel & Turner, 2004, p. 59; Moharam, Elsamadicy & Negm, 2020, p. 20). Wong (2021, p. 391) argues that CSR initiatives influence the buying behaviour of Z consumers, which results from their profile characteristics. Generation Z members are socially aware and want to express their identity and belonging. Companies may help them define themselves through socially responsible actions (Narayanan, 2022, p. 907). Gen Z consumers share the values of corporate social responsibility and are sensitive to environmental and social issues (Casalegno, Candelo & Santoro, 2022, p. 1011). As a result, they identify themselves with socially responsible organisations and build their social identity by participating in cause-related marketing campaigns.

2.2. Purchase Intention

Regarding the financial outcomes of cause-related marketing, purchase intentions (PI) have been the focus of at least two studies (Lafferty & Edmondson, 2014; Zhang *et al.*, 2020). PI is defined as a willingness to buy a given product in the future under certain conditions (Parengkuan, 2017, p. 11). It is expected that the greater the purchase intention, the greater the likelihood the purchase will be made.

Previous studies have presented a variety of independent variables that can impact the effects of cause-related marketing on PI (Zhang *et al.*, 2020; Fan *et al.*, 2022). Since Gen Z is environmentally and socially conscious, they are concerned with the internal and external CSR practices of the firms (Stec-Rusiecka & Warمیńska, 2022, p. 72) from which they purchase goods. In this context, it becomes important to determine whether Polish Gen Z consumers are willing to buy a cause-related product. The following null hypothesis is proposed:

H1: Generation Z customers who were “likely” and who were “not likely” to purchase cause-related products occur with probabilities of 0.500.

2.3. Product Type

An important consideration in cause-related marketing is the product. Various products evoke different emotions, which accompany their purchase and use. Hedonic products are related to pleasure-oriented consumption and are not perceived in terms of “good choice” and “value for money”. Utilitarian products, on the other hand, are purchased for their functional characteristics to fill consumers’ functional, basic needs; and they are related to goal-oriented consumption (Strahilevitz & Myers, 1998, p. 436; Goldsmith & Yimin, 2014, p. 80).

Some studies suggested that charitable giving works better for hedonic products. Linking such products with a charitable campaign is more effective due to the lower price flexibility of hedonic products, pleasure, and the guilt of buying them, and the “warm glow feeling” that comes with being prosocial (Strahilevitz & Myers, 1998; Strahilevitz, 1999; Chang & Chu, 2020). Other studies have recommended the use of utilitarian products for cause-related campaigns. These can be linked with monetary promotions and eastern culture, in which individuals prefer utilitarian to hedonic products in CRM campaigns (Chandon, Wansink & Laurant, 2000; Fan *et al.*, 2022). It follows that the impact of the type of product on the effectiveness of a cause-related marketing campaign is not unambiguous. Based on this, the following null hypothesis is proposed:

H2: Product type does not significantly differentiate the purchasing intentions of Gen Z consumers in relation to cause-related products.

2.4. Donation Magnitude

In a CRM campaign, donation size is defined as the amount of money a company pays to support a social cause. Some research shows that it does not matter how large the donation is to support the social cause (Vaidyanathan & Aggarwal, 2005; Barone, Norman & Miyazaki, 2007). One explanation for the lack of donation effects is the small difference between a low and high CRM donation amount

(Bergkvist & Zhou, 2019). On the other hand, Moosmayer and Fulian (2010) and Strahilevitz (1999) argue that larger donations suggest more favourable attitudes towards a cause-related campaign than smaller ones, resulting in higher consumer willingness to buy a product. A large donation is not always beneficial and could have a negative impact on the consumer response to a CRM campaign. This is mainly explained by consumer skepticism, resulting from the assessment of the companies' motives to engage in charitable actions (Tsiros & Irmak, 2020; Chaabouni, Jridi & Bakini, 2021).

To summarise, studies show null, positive, and negative effects of increasing the donation amount on the effectiveness of a CRM campaign. This leads us to propose the following null hypothesis:

H3: Donation size does not significantly differentiate the purchasing intentions of Gen Z consumers in relation to cause-related products.

2.5. Cause Type and Cause Involvement

In a cause-related marketing campaign, the social cause may stimulate consumers to buy one brand, if it is valuable to them, instead of another. Most CRM campaigns refer to environmental, health, human-being and animal-welfare-related causes (Zhang *et al.*, 2020, pp. 5–9). The relationship between the social cause category and consumer behaviour is not unequivocal. Lafferty and Edmondson (2014, p. 1458) found that the cause category does not differentiate consumers' willingness to buy cause-related products. However, Fan *et al.* (2022, p. 353) argued that a CRM campaign should be linked with humanitarian rather than animal or environmental causes.

Assuming the definition of Zaichkowsky's (1985, p. 342) involvement, cause involvement is defined as the level of importance a person attaches to the cause, shaped by individual inherent needs, values, and interests. Given the personal nature of social causes, consumers may perceive their causes differently, thereby differentiating purchase intentions. Since most studies have confirmed that the greater the consumer involvement with the cause, the greater the effectiveness of a cause-related marketing campaign (Bester & Jere, 2012; Lafferty & Edmondson, 2014; Moharam, Elsamadicy & Negm, 2020, p. 21), the following null hypotheses are proposed:

H4: Cause type does not significantly differentiate the purchasing intentions of Gen Z consumers in relation to cause-related products.

H5: Cause involvement does not significantly differentiate the purchasing intentions of Gen Z consumers in relation to cause-related products.

2.6. Attitude towards CRM Campaigns and Attitude towards Helping Others

In cause-related marketing, attitudes are used as both an antecedent factor and a consequence. In this study, they were placed as an antecedent and affective construct. In affective understanding, attitude was defined as positive or negative emotions toward cause-related marketing campaigns and charitable behaviour.

In general, consumer attitudes towards corporate social responsibility are positive (Boccia, Malgeri & Covino, 2019, pp. 98–103). Therefore, consumers' favourable attitudes towards CRM and their positive impact on economic outcomes are expected. This validates findings in the literature (Natarajan, Balasubramaniam & Jublee, 2016; Rego & Hamilton, 2021). Both egoistic and altruistic values may affect consumers' willingness to buy cause-related products. Most studies confirm that people who accept altruistic, self-transcendence values are more engaged in prosocial behaviour expressed as the willingness to buy cause-related products than individuals who value self-enhancement, self-interest value (Lee & Kim, 2016; Baek *et al.*, 2020). The following null hypotheses were tested:

H7: Attitudes towards the CRM campaign do not significantly differentiate the purchasing intentions of Gen Z consumers.

H8: Attitudes towards helping others/a cause do not significantly differentiate the purchasing intentions of Gen Z consumers.

3. Methodology

An explanatory study was utilised. It presents an experimental design related to the intention to purchase a particular cause-related product. The study used a scheme $2 \times 2 \times 4$ (product type \times donation size \times cause type) control variable. Two low-involvement and low-price items were selected. Chocolate praline was chosen as a hedonic (frivolous) product, and toilet cleaner as a utilitarian (practical) product. To determine the amount of the donation, the approach used by Vaidyanathan and Aggarwal (2005) was followed. The small donation size and large donation size were set at 6.3% and 12.5% of the regular price of both products, respectively. The social causes selected for this research represent all categories of social issues mentioned by Lafferty and Edmondson (2014). They were fitted with utilitarian and hedonic products based on functional compliance with the selected products (Table 1).

The target group of respondents were all members of Generation Z (age: 18–25). A non-probability sampling procedure with a chain referral technique called “the snowball” was applied. First, 40 university students in Poland completed questionnaires. They were then asked to distribute them among other students, relatives,

acquaintances, or friends, all of whom belonged to Generation Z. As a result of this procedure, 408 survey questionnaires were collected. After eliminating questionnaires that revealed dubious response patterns, 371 responses were included in the present study. 67% of respondents were female, 54% were employed and 94% of respondents had donated to charity in the previous year.

Table 1. Experiment Scheme

No. Questionnaire	Product Type	Product Category	Product Price	Donation Size	Social Cause	Product Cause Fit
1	utilitarian	toilet cleaner	10.99 PLN per 0.750 mln	0.70	natural environment preservation	high
2				1.40		
3				0.70	people with diabetes	low
4				1.40		
5	hedonic	chocolate praline	20.99 PLN per 200 g	1.30	hungry children	high
6				2.60		
7				1.30	battered animals	low
8				2.30		

Source: the author.

Each of the respondents received, at random, one of the eight questionnaires with the scenario of the fictitious CRM campaign linked with a printed, product-oriented advertisement and a set of questions. Fictitious brands were created to eliminate respondents' past and present experiences with a particular company and social cause, which could have had an impact on the results. The participants in the study were asked to provide their opinion on several statements. These concerned the purchase intention of advertised cause-related products, the importance of the social cause specified in the advertisement, the attitude toward cause-related marketing and helping a cause, as well as the consumer's experience of Generation Z in making charitable contributions.

The various measures were compiled into a questionnaire. A five-item, seven-point Likert scale was used to measure purchase intention, based on Hou, Du and Li (2008), and Vaidyanathan and Aggarwal (2005). Attitudes toward CRM campaigns and toward helping were measured using a four/five-item, seven-point Likert scale applied by Kropp, Holden and Levack (1999) and Webb, Green and Brashear (2000), respectively. A five-item, seven-point, bipolar adjectival scale was used to measure cause involvement (Grau & Folse, 2007).

Table 2. Validity and Reliability of Measures

Factor	Item	Factor Loading	Loading Average	α	CR	AVE	KMO
Purchase intention	purchase 1	0.717	0.837	0.893	0.922	0.704	0.859
	purchase 2	0.831					
	purchase 3	0.876					
	purchase 4	0.872					
	purchase 5	0.888					
Attitude toward CrM campaign	attitude 1	0.848	0.837	0.856	0.954	0.805	0.892
	attitude 2	0.835					
	attitude 3	0.889					
	attitude 4	0.777					
Cause involvement	involvement 1	0.899	0.897	0.939	0.904	0.703	0.810
	involvement 2	0.916					
	involvement 3	0.896					
	involvement 4	0.920					
	involvement 5	0.855					
Attitude toward helping others	attitude H1	0.882	0.892	0.912	0.939	0.795	0.854
	attitude H2	0.896					
	attitude H3	0.895					
	attitude H4	0.893					

Notes: α – Cronbach's alpha, CR – composite reliability, AVE – average extracted variance, KMO – Kaiser-Meyer-Olkin test for sampling adequacy; significance < 0.001.

Source: the author.

Data were analysed using SPSS software. The analysis procedures took place in three stages. The first included an assessment of reliability and validity measures as well as sampling adequacy of the four constructs. Table 2 shows that all the model variables exceeded the recommended minimum values (Shrestha, 2021, pp. 5–6). Subsequently, the data were transformed for variables measured on a semantic differential scale and a Likert-type scale. In this case, responses were converted into nominal scales: declared favourable attitudes toward CRM (no/yes) and cause importance (low/high). The median value was used to classify respondents into these categories. The ultimate step was to examine the impact of CRM campaign characteristics and the consumer's personality on the purchase intention of cause-related products. A series of non-parametric tests (NPT) was performed to test null hypotheses. The NPT were selected based on the results of the Shapiro-Wilk normality test. In each case, the p -value for the independent variable is less

than 0.001, indicating substantial evidence to reject the null hypothesis that the variable adheres to a normal distribution.

4. Results and Discussion

A one-sample binomial test was conducted to assess the occurrence probabilities of two categories within Generation Z: potential customers who are “likely” or “not likely” to purchase cause-related products. The probability for both categories was set at 0.500. The results of the test revealed a *p*-value of less than 0.001, leading to the rejection of the null hypothesis (as indicated in Table 3). It was found that cause-related marketing is an effective CSR tactic that resonates with Generation Z, a fact that aligns with previous studies (Mall, 2022; Choudhary & Suresh, 2023). The frequency distributions depicted in Figure 1 illustrate the percentage of cases falling into each category of the variable. It is evident that among Generation Z customers in Poland, 66% demonstrate a willingness to purchase cause-related products. In comparison to findings from other studies, it is noteworthy that 89% of Australian (Premack, 2018) and 92% of American Gen-Zers (Cone Communications, 2017) express a preference for buying from companies that support social and environmental causes.

Table 3. Results of the One-sample Test

Categories of Gen Z Consumers	<i>n</i>	Observed Proportion	Test Proportion	Exact Significance (1-tailed)
Group 1 (purchase intention ≤ 4)	126	0.34	0.50	< 0.001
Group 2 (purchase intention > 4)	245	0.66		
Total	371	1.00	–	–

Source: the author.

The inclination towards prosocial behaviour among Generation Z aligns with the social psychological perspective encapsulated by social identity theory, which holds that individuals engage in such behaviour not only to maintain positive self-perceptions but also to establish their affiliation with distinct social groups.

The present study also examined the effect of design elements of CRM campaigns on Gen Z consumer buying behaviour. Mann-Whitney U tests were conducted to determine the impact of product type and donation size on the purchase intention of cause-related products. The summary of the results for the H2 and H3 hypothesis tests is presented in Table 4. The results show a non-significant difference between both the purchase intention of hedonic and utilitarian products ($Z = 0.457, p = 0.648$) and the purchase intention of cause-related

products linked with a low and high donation ($Z = -1.680, p = 0.093$). The null hypotheses are supported at a 5% significance level.

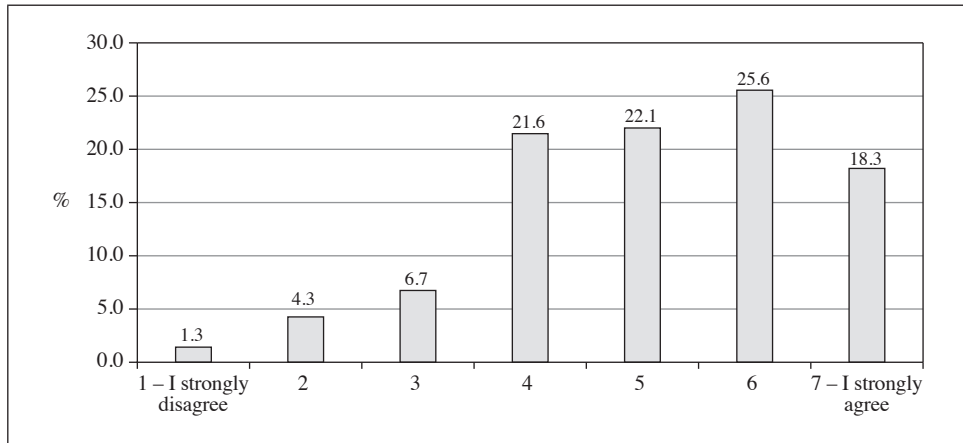


Fig. 1. Willingness to Buy Cause-related Product

Source: the author.

In other studies, some researchers recommend the use of utilitarian products, while others state that cause-related marketing campaigns related to hedonic products are more effective (e.g. Strahilevitz, 1999; Chandon, Wansink & Laurant, 2000; Chang & Chu, 2020; Fan *et al.*, 2022; Patel, Thomas & Bhatt, 2023; Schamp *et al.*, 2023). In contrast to that research, the result of this study provides evidence that there is no direct causal relationship between the type of product used in a campaign and the purchase intentions of Gen Z. My findings are in line with research by Silva *et al.* (2021), which shows that both frivolous and practical products impact the purchase intention of cause-related products.

Table 4. Results of the Mann-Whitney U Test on the Effect of Product Type and Donation Size on Purchase Intentions of Cause-related Products

Dependent Variable	Independent Variable		n	Mean Rank	Sum of Ranks	Mann-Whitney U	Z	p
Purchase intention	product type	utilitarian	182	188.54	34,313.50	16,737.50	0.457	0.648
		hedonic	189	183.53	34,692.50			
	donation size	low	188	176.98	33,271.50	15,505.50	-1.68	0.093
		high	183	195.27	35,734.50			

Source: the author.

Studies have also explored the effect of donation size. Conventional wisdom suggests that donation magnitude is one of the critical factors in a consumer’s decision to buy a cause-related product (Strahilevitz, 1999; Hajjat, 2003; Kureshi & Thomas, 2020). This study found that donation magnitude does not affect the purchase intentions of Gen Z, contradicting the findings of Patel, Thomas and Bhatt (2023). They revealed that smaller donation size (combined with vague donation message-framing) would not appeal to Generation Z while buying CRM-linked hedonic and utilitarian products.

The result of my research are also inconsistent with the findings of researchers such as Gerhardsson, Bergh and Thongpitaks (2021), as well as Barone, Norman, and Miyazaki (2007) and Vaidyanathan and Aggarwal (2005). A key explanation for the lack of impact of both variables on purchase intentions is the strong environmental and social sensitivity of Generation Z (Casalegno, Candelo & Santoro, 2022, p. 1011). Its interest and commitment to social causes contribute to the demonstration of pro-social behaviour through the purchase of cause-related products, regardless of the donation or product associated with the CRM campaign.

Table 5 shows that the results of the study supported hypothesis 4. A Kruskal-Wallis H tested whether the category of the cause (environment, health, human-being and animal-welfare) influenced purchase intention. It revealed that there is not a statistically significant difference in the dependent variable between the different causes ($\chi^2(3) = 0.367, p = 0.9470$). These results are consistent with the studies of Lafferty and Edmondson (2014), who found that consumers considered the cause category irrelevant when purchasing cause-related products.

Table 5. Results of Kruskal-Wallis H Test Differences in Purchase Intentions Related to the Cause Category

Dependent Variable	Independent Grouping Variable	<i>n</i>	Sum of Ranks	Average Rank	χ^2	df	<i>p</i>
Purchase intention	Cause:	371	–	–	0.367	3	0.9470
	– natural environment preservation	99	18,685.00	188.74			
	– people with diabetes	83	15,628.50	188.30			
	– hungry children	88	16,438.00	186.80			
	– battered animals	101	18,254.50	180.74			

Source: the author.

To evaluate the effect of the Gen Z consumer’s personalities on purchase intention, Mann-Whitney U tests were utilised. The results indicate a significant difference in prosocial behaviour between group consumers who differ in their attitudes towards cause-related marketing ($Z = -7.888, p = 0.409$), willingness to help others

($Z = 4.916, p \leq 0.001$) and the importance of the social cause exposed in the CRM campaign ($Z = -6.963, p \leq 0.001$). Because the p -value is less than the significance level of 0.05, the null hypotheses (H6, H7 and H5) can be rejected, and the alternative hypotheses accepted. There is evidence of differences in purchase intention between the groups compared. As Table 6 shows, consumers with a favourable attitude towards CRM had a higher average rank of purchase intentions (216.24) than consumers with unfavourable attitudes (125.02), as did consumers who accept altruistic values (201.59) than consumers who do not (140.06) and consumers for whom the social cause exposed in a CRM campaign is more important (218.11) than less important (141.25).

Table 6. Results of the Mann-Whitney U Test on the Effect of Consumer Personality on Purchase Intentions of Cause-related Products

Independent Variable	Variable Group	<i>n</i>	Sum of Ranks	Average Rank	Mann-Whitney U	<i>Z</i>	<i>p</i>
Declared favourable attitude toward CRM	no	123	15,378.00	125.02	7,752.00	-7.888	0.000
	yes	248	53,628.00	216.24			
Favourable attitudes toward helping others	no	94	13,166.00	140.06	8,701.00	4.916	< 0.001
	yes	277	55,840.00	201.59			
Cause importance	low	155	21,894.50	141.25	9,804.50	-6.963	< 0.001
	high	216	47,111.50	218.11			

Source: the author.

The results of this study were consistent with similar research: favourable attitudes toward CSR, including CRM initiatives, lead to greater purchase intentions among Gen Z consumers (Pandey, Chawla & Puri, 2020; Thomas, Bhatt & Patel, 2024). Studies also show that if customers are high in altruistic motivation, they are more likely to give to charity for a cause. These findings also concurred with other studies: consumer altruism is a key factor behind a CRM campaign's success (Wallace, Buil & Chernatony, 2017; Fan *et al.*, 2022).

Cause involvement is another factor that explains the purchase of cause-related products. This result confirms the finding of Maceli and Zafuta (2022) and Shin, Eastman and Li (2021) that Generation Z consumers are willing to buy products that embody their values and are personally relevant to them. Other studies also suggest that consumer response to a CRM campaign is more positive when the cause is important to them (e.g. Gerhardsson, Bergh & Thongpitaks, 2021). According to the social identity theory, to reinforce their self-concept, people will tend to be more participative in CRM campaigns and have a more favourable opinion of the social cause with which they identify. They may identify with different causes, so different CRM campaigns can also evoke different behavioural attitudes (Silva *et al.*, 2021).

Lafferty and Edmondson (2014, p. 1455) argue that cause involvement is often not the reason to donate to a worthy cause. In cause-related marketing campaigns, the consumer focuses on the product, while the social cause may stimulate a consumer to switch brands if it is worthy, but often the cause is not personally relevant to the consumer. When there is no cause-brand alliance, the personal importance of a cause plays a vital role in determining which cause will receive a donation. An incongruent match between cause and brand can stimulate negative associations and directly affect the evaluation of the alliance (Lafferty, Goldsmith & Hult, 2004, p. 514). For my research here, fictitious brands were created to eliminate a respondent's past and present experiences with a particular company. This may explain the positive impact of cause involvement on Gen Z purchase intention.

5. Conclusions

This study makes an important contribution to the existing literature on the impact of cause-related marketing on Gen Z buying behaviour in Poland.

The paper answers two main questions: first, whether Z consumers adopt pro-social attitudes and, second, how the design elements of a CRM campaign and the personality traits of Gen Z differ in their impact on purchase intentions. Studies have found that individuals belonging to this cohort value CSR activities and reward responsible companies. Gen Z consumers in Poland want to engage in charitable marketing initiatives by purchasing products from socially responsible companies. The results suggest that neither the cause of the social cause nor the size of the donation had an impact on consumers' purchasing intentions, providing a new perspective on the role of product type in cause-related marketing. It has been proven that there is no direct causal relationship between the type of product used in a campaign and the purchase intention of Gen Z. Studies also show that if the Z customers are high on altruism and connected with the cause, and have a positive attitude toward CRM initiatives, they are more likely to donate to a given cause.

Moharam, Elsamadicy and Negm (2020) argue that understanding target customers is a crucial factor in a CRM strategy's success. Members of Generation Z are increasingly considering their impact on society and the environment when making decisions (Narayanan, 2022, p. 905; MiŚOT Akademia, 2023). Thus, cause-related marketing, which involves a company aligning with social and environmental causes, stands as a compelling strategy for businesses targeting Gen Z consumers. To effectively convince them to purchase products linked with a cause, companies should adopt a purpose-driven approach, integrating CSR values with Marketing 5.0 strategy, which meets the values of Z consumers. This strategy can help build a strong image of a socially responsible brand, increase trust among Generation Z and build a lasting connection as well as loyalty with this group of socially responsible consumers.

Gen Z is looking for brands that contribute positively to society and align with their core values. Z consumers value authenticity and transparency in marketing communication and measurable outcomes of a company's activities (Reif *et al.*, 2019; MiŚOT Akademia, 2023; Neufeld-Wall, 2023, pp. 1, 41). Meeting these expectations can effectively motivate Gen Z to participate in a CRM campaign. In terms of attitudes toward a CRM campaign and altruistic motivation, previous studies show that consumers can be skeptical about the true motives of companies engaging in cause-related marketing (e.g., Chaabouni, Jridi & Bakini, 2021). Thus, to overcome skepticism and effectively engage Gen Z in cause-related marketing, marketers must assure the target market that their commitment to the given cause is not merely superficial or opportunistic marketing ploys, but an integral part of the charity embodied in their CSR strategy. Reaching consumers more successfully requires the development of cause-related marketing campaigns linked with social causes Gen Z consumers prefer. Educational campaigns that provide in-depth information about a cause could be a good way to strengthen Gen Z's altruistic motivation and favourable attitudes toward CRM as well as foster empathy and a deeper connection to the cause.

Marketers should also highlight prosocial actions using clear communication about supporting the cause, detailing their initiatives, and showcasing genuine changes resulting from their CRM efforts and the participation of Gen Z, the digital generation (Ismail, Nugroho & Rohayati, 2023, p. 123). It is the first to have grown up with global connectivity, facilitated by smartphones, tablets, smartwatches and heavy reliance on social media, which comes to us with powerful tools for Marketing 5.0. These media constitute an integral part of Gen Z's digital life along with Internet connectivity (Maceli, 2022, p. 46; Dutt, 2023, p. 1339). Therefore, the company should communicate with Gen Z through a social media platform, using generated content that showcases its commitment to a cause and interactive prosocial campaign, and engaging influencers who espouse the values of Generation Z and actively promote altruistic attitudes. This should enhance the reach and reliability of CRM messages and create a sense of community around the common good to make the world a better place.

The present study has limitations that should be considered in future studies. Firstly, low-value and low-engagement products were used. Because product type can impact CRM effectiveness, similar studies should be conducted with various products to see their impact on Gen Z's prosocial behaviour. Secondly, the results of this study might be influenced by selected causes. When the cause is well known or is of high importance to consumers, they have highly favourable attitudes towards the CRM campaign, which can lead to the purchase of products supporting a social cause. Thus, future research should consider other social issues. Another limitation is the sample, which comes from a single country, potentially influencing the results.

Other studies have shown that affective, volitional, and behavioural attitudes toward CSR, including CRM practices, can differ from country to country. In this case the collectivist nature of Poland may have influenced Generation Z consumers' reactions to cause-related marketing campaigns. It would therefore be reasonable to repeat these studies in other countries. Future studies could also compare different cultures and contrast the effect of the design elements of a CRM campaign on Gen Z purchase intentions. Finally, the results of the study could be influenced by donation size. In this study, there were no significant differences in donation sizes linked with the product used in a CRM campaign (6.3% vs. 12.5% of product prices). Gerhardsson, Bergh, and Thongpitaks (2020) examined different donation levels (0.13–32%; 1.88–67.5%; 2.5–40% of the price). They found that greater donation amounts lead to more positive CRM participation intentions.

Conflict of Interest

The author declares no conflict of interest.

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The Business Model of Digital Labour Platforms and the Income of Platform Workers in Poland: Theory and Practice

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ABSTRACT

Objective: The article examines the business model of digital labour platforms (DLPs) and the relative financial attractiveness of this form of work for platform workers.

Research Design & Methods: The leading research methods used in the article include a critical analysis of the scientific achievements of Polish and international literature on the topic and a diagnostic survey using a questionnaire.

Findings: The business model of digital labour platforms inherently exerts downward pressure on earnings, favouring low worker income. This pattern affects the pricing of both online and offline services. However, survey results indicate that most service providers in Poland have experienced an income increase since starting work through these online platforms, compared to their previous earnings.

Implications/Recommendations: The business model of digital labour platforms theoretically incorporates elements that force down the incomes of service providers. However, the delivery of services within this framework can, depending on the national context, potentially lead to an increase in platform workers' earnings. That being said, the relative income growth observed in the Polish labour market does not necessarily contradict the overarching trend of relatively low earnings for the workers in this sector.

Contribution: The topic of platform work and the income of individuals engaged with DLPs in Poland have received limited attention from researchers. There has been also a notable absence of studies addressing these phenomena, particularly with regard to changes in income. The contribution of the present study is that it fills this gap in the literature.

Article type: original article.

Keywords: digital labour platforms, business model, gig economy, platform workers, income.

JEL Classification: C83, D29, J31, J49.

1. Introduction

Coordination of the exchange of work services through specialised Internet platforms (digital labour platforms – DLP) has become an attractive and popular way of doing business since they first appeared. In the process, a new segment of labour market, the “gig economy”, emerged. According to International Labour Organization statistics, the number of such platforms rose significantly – from 142 in 2010 to over 777 in 2020 (ILO, 2021, p. 19). This rapid growth has provoked scholarly discussion of its consequences for the nature of work. Initially, DLPs were perceived as solutions which offered more avenues to income for the US workforce, especially for those who were previously outside the labour market during and after the 2007+ crisis. However, after some time researchers uncovered that such tools had become “accelerants of precarity” (Vallas & Schor, 2020, p. 279), exposing workers to the negative consequences in this segment of the labour market in the absence of adequate regulation. This reproach applied not only to the USA, but also to other countries where such platforms began to gain popularity, including the European Union member states and many developing countries the world over.

DLP also emerged in Poland, and the criticism increasingly facing them prompted the following question: despite the bad reputation, could providing services in this business model be financially attractive in Poland (compared to a previous job)? This study takes a closer look at platform-based digital business models in the context of the mechanism of determining payment for services rendered and their relative amount. The primary aim of the article is to assess to what extent and in what direction the income gained by platform workers in Poland has changed.

The following hypothesis was formulated: the business model of digital labour platforms contains in its theoretical structure elements favouring low income gained by contractors, though actual relative income results may vary in the national context.

Some issues concerning platform work are discussed regardless of geographic location. But the specificity of the business model determines its reception and

popularity in particular countries, as well as its aftermath. The article looks at the Polish economy, where the platform economy – despite its increasing ubiquity – remains a relatively new and insufficiently researched way of doing business. Some foreign studies have provided insights into contractors' various experiences (i.a. Lehdonvirta, 2018; Myhill, Richards & Sang, 2021; Chen *et al.*, 2022; Çiğdem, 2022; Zipperer *et al.*, 2022), but quantitative evidence on platform workers is still scarce and self-reported data from surveys are especially problematic around the world.

The paper is organised as follows: the second section focuses briefly on the concept of the digital labour platform and the gig economy. The next section examines the price formation mechanism at work in the model. The empirical part of the paper presents the methodology, while also referring to several findings from the literature analysis. It discusses them in light of the research results obtained. The data presented here provide a unique opportunity to explore Polish platform workers' experiences with regards to their income. The empirical research conducted is the first of its kind in the country. The article ends with conclusions.

The research methods used in the article include a critical analysis of the scientific achievements of Polish and global literature on the topic as well as a diagnostic survey in the form of a questionnaire.

2. The Digital Labour Platform as a Business Model

The term “business model” has gradually found its place among academic literature, but has not become an established concept (DaSilva & Trkman, 2014) because authors examine it through multiple subject-matter lenses. Interpretations that have emerged often refer to an explanation of how value is created. Some also maintain that business models delineate a system-level, holistic approach to explaining how firms “do business” (Zott, Amit & Massa, 2011), or as a kind of scheme or formal conceptual representation of how a business functions (Massa, Tucci & Afuah, 2016). In any case, the definitions need not be mutually exclusive. A business model can be an architecture an enterprise can use in providing tangible or intangible goods or service or the basis for processes taking place in the firm itself and those caused in its environment. With regard to value creation, while it indicates the potential benefits gained by all participants (actors) of processes related to the functioning of the company, including income, it should be treated as an element of business that determines the balance of power between all actors. Thus, the model makes it possible to assess the advantage gained by each individual group of actors – company owners, managers, employees, suppliers or buyers of a given good (Cicharska, Styczeń & Szaro, 2018, p. 10).

Analysis of a business model enables one to determine the relations between the aforementioned groups and advantages of certain groups of actors over others, or to

identify areas of their interdependence or common interests. It can also be helpful in assessing whether the dissemination of a specific business model in a given economy may potentially affect the position of these actors in terms of income.

One of the most interesting business models to have been developed over the past decade is that of digital platforms, which enable and coordinate the exchange of work services. The expansion in broadband connectivity and cloud computing, the popularity of mobile applications, and other innovations in information and communications technologies – ICT (ILO, 2021) may all have enabled this model to emerge. Growing labour market flexibility, reflecting a persistent trend of outsourcing of work to independent contractors and contingent work (Koutsimpogiorgos *et al.*, 2020), may also have played a role.

The platforms mediating work should be clearly distinguished from the more general concept of digital (Internet) platforms, which provide a seemingly limitless range of services, including electronic payments (PayPal) and communication (Skype, Zoom). Internet platforms can be also used to coordinate services on resources other than work, such as assets (e.g. a renting/sharing platform such as Airbnb), crowdfunding or social media. DLP should be classified under the category “gig economy”. However, there is a range of definitions and approaches to the gig economy, both in academia and in policy documents. A clear-cut conceptual distinction is not always fully applicable. Some authors define the gig economy too broadly, including as an additional range of economic activities such as employees (alongside independent contractors), unpaid tasks, or goods rented out in the “sharing economy” (Koutsimpogiorgos *et al.*, 2020). This is the result of placing labour platforms and other Internet platforms under the same conceptual umbrella (Healy, Nicholson & Pekarek, 2017). In this article, the gig economy is defined more narrowly – as the ensemble of *ex ante* specified, paid tasks carried out by independent contractors on online platforms.

Having entered a number of economic sectors, DLP can be classified into the categories presented in Table 1.

The most widely known company in Table 1 is Uber, the poster child for everything deemed positive or negative about work mediated by DLP. Some players operate only on the domestic (Hilfr) or regional (Rappi) market, while others, like Uber and Upwork, are global giants (ILO, 2021, p. 19). Regardless of the country in question, estimating the actual size of the platform-mediated workforce is a challenge due to the platforms’ tendency not to disclose data.

There are at least four groups of actors involved in the operating of DLP:

- creators/concurrent owners of the tools,
- clients – requesters, individual users (service recipients, buyers – consumers or businesses),

– platform workers – self-employed or independently operating contractors, representing the supply side whose work is mediated through a platform; also called gig workers, giggers, taskers, suppliers, service providers, external employment (despite not being employed by platform owners) or an on-demand workforce (however, this is a broader concept); they work on their own account and at their own risk,

– managers (business organisers, internal employment) a relatively small group of employed individuals who oversee the functioning of the platform on an ongoing basis.

Table 1. Digital Labour Platform Categories

Category	Depiction	Tasks	Types of Platforms and/or Players
Web-based digital labour	tasks or work assignments are performed online or remotely by workers	text translation, legal, financial and patent services, design and software development, graphic design, advertising	freelance platforms: Upwork, Freelancer, Zhubajie, Kabanchik, Toptal contest-based platforms: 99designs, Designhill, Hatchwise
		solving complex programming or data analytics problems within a designated time	competitive programming platforms: HackerRank, TopCoder, Codeforces Kaggle
		short-term tasks, such as annotating images, moderating content, or video transcription	microtask platforms: Amazon Mechanical Turk (AMT), Clickworker, Microworkers, Appen
		medical consultation	1Doc3, DocOnline, MDLive
Location-based	if a job is manual work the tasks are carried out offline – in person in specified physical locations by workers	taxi, delivery, care provision, house cleaning, odd jobs (such as a plumber or electrician)	Uber, Deliveroo, Glovo, Task Rabbit, Lieferando, Helpling, care.com, Hilfr, Rappi
Hybrid	combining remote and offline work	offer a wide range of labour and other services – delivery, logistics and payment services	Grab, Jumia

Source: the author, based on (ILO, 2021, pp. 18, 40, 47; Schmidt, 2017).

In the article, the following terms are used: platforms owners, clients, platform workers and business organisers. Each group must benefit somehow, otherwise they would not participate in the model.

Regardless of the type or the category of DLP in question, the business model employed will share some elements (ILO, 2021, p. 72):

- recruitment and matching (providing access to accounts on platforms, matching algorithms, assigning work, setting prices for tasks, refund policies),
- work processes and performance management (monitoring, tracking and evaluating workers through digital tools and algorithms),
- revenue model (commission fees, subscription plans, bonus schemes),
- rules of platform governance (exclusivity clauses, acceptance/rejection of work, deactivations of accounts, dispute resolution, data collection and usage).

The DLP business model is relatively simple: it uses algorithms on a platform to match tasks or clients with workers, the latter of whom can accept or reject the former. Acceptance does not entail long-term or regular cooperation. It almost always results in the performance of only a short, single task (a so-called gig) compensated on a piece-rate basis. Most platforms charge workers commission fees (while the client is often subsidised and either pays a lower fee for an account to be processed or no fee at all). Clients gain access to an on-demand and relatively cheap workforce.

The legal status of an “independent contractor” implies, *inter alia*, a certain amount of autonomy and control over their schedule, but the sense of control can be deceptive. DLPs have tremendous control over the organisation of work and workers’ compensation, while “still claiming to be only an intermediary” (Kenney & Zysman, 2016, p. 62). Ostoż (2022) proves that most such platforms are actively involved in the transaction (including matching or pricing) as well as in evaluating gigs (through timing, reviews and ratings). Such evaluations may be fed back into the matching algorithm (Koutsimpogiorgos *et al.*, 2020; ILO, 2021). Although the idea of the business model is indeed to create a space for establishing and developing cooperation between those who request labour services and their contractors, the outlined method of acquiring, organising, coordinating and monitoring their activities and determining the amount and method of payment for the service they provide is far more sophisticated than a simple “bulletin board” or “database” for tasks.

Most of the considerations here focus on the supply side and their income issues. It is difficult, however, to fully understand their situation without examining the other actors involved (especially platform owners) as well as aspects beyond income.

3. A Mechanism for Determining the Price of Services in the DLP Model

The basic economic determinant of the value of work is the level of remuneration. In macroeconomic terms, this level results from the game of labour demand and supply, as well as legal regulations governing them. In the microeconomic approach referenced in this article, the value of work can be analysed from the perspective of human capital, job position and the employee themselves. Higher quality human capital usually leads to higher remuneration. This simple relationship, resulting both from theory and practice in the “non-platform” economy, apparently finds a simple translation into the reality of the platform economy. Namely, professionals such as lawyers, consultants and data scientists are better paid than the skilled workforce, such as handymen/women, drivers or editors. The unskilled group (delivery workers, dog walkers, errand-runners, servers) earns the least. Higher rates are offered for more complex tasks requiring higher qualifications or longer-term experience from the service provider than for simple tasks that require less skill or experience.

Although wage gaps determined by tasks performed or specialisation are obvious, an in-depth analysis of the price setting mechanism specific to this business model may suggest that the overall price level of services mediated via platforms is usually lower than their counterparts provided beyond the platform economy. The mediation itself and related commissions, which in fact also occur in the “traditional” economy, is one reason for this. However, in the gig economy the commission fee can be hefty – between 10% and 35% of the price charged, leaving workers with earnings between 65% and 90% of the service price (De Stefano & Aloisi, 2018, p. 15; ILO, 2021, p. 79). Beyond these fees, there are several other reasons workers earn low wages on DLPs.

On DLPs, rates can be set either by the worker or the platform, though in almost all cases the latter handles the payments. There is almost always compensation on a piece-rate basis (by the task) – more rarely, a gig is remunerated on an hourly basis (with invasive monitoring activity) and rarely at a “minimum rate”. Accordingly, a relationship can be established between the qualitative nature of the work and the payment scheme. When the platform determines prices, routine tasks come at a fixed or variable fee and the fare is calculated based on prevailing market factors. Estimators can also be used. In very few cases, rates are negotiated between the client and the platform worker or the latter can freely set and advertise a charge for specific activities (De Stefano & Aloisi, 2018, pp. 22–23).

Yet another reason for lower prices of services lies in the tendency to break down tasks into their simplest possible form, for which the lowest possible rate is set. While having large projects might at first glance seem financially advantageous for contractors, it turns out that, wherever feasible, tasks are often dispersed, which contributes to lower unit costs and a corresponding fall in the remuneration of those

who perform them. Small tasks separated from large projects are outsourced to independent subcontractors via specialised platforms (Ostoj, 2022).

Labour laws, including those governing the minimum wage, and social security contributions are mostly covered by platform workers alone, who are also not entitled to the kind of participation common in other segments of economy. There are large disparities in insurance, work-related injury benefits, old-age pension or retirement benefits, all of which increases the risk of precariousness (ILO, 2021). These discrepancies, raised by critics of the model (Collier, Dubal & Carter, 2017; Schmidt, 2017), let platform owners reduce labour costs that then translate into a lower price of services offered through the platforms, making them more affordable and attractive for clients.

The next crucial reason for the relatively low price of services is that labour supply exceeds demand, which leads to greater competition among platform workers for task assignment and puts downward pressure on their earnings (Ostoj, 2022). This oversupply stems from three triggers. The first one is quite trivial and comes down to the intuitiveness of operating on the platforms. Practically anyone can become a service provider. Another, more consequential trigger is the global reach of the gig economy, especially its online iteration. In a virtual environment, both customers and workers from different countries (and even continents) are able to participate, thus, some projects can be carried out by organisationally, geographically and temporally dispersed individuals (Shevchuk, Strebkov & Tyulyupo, 2021). This dispersion also puts workers from developing countries into competition. In such parts of the world, DLP can be perceived as a promising source of work opportunities, leading some governments to invest in skills and digital infrastructure (ILO, 2021, p. 18). This is one reason platform workers from emerging markets in particular tend to accept extremely low wages. The third trigger is the COVID-19 outbreak, with labour supply on platforms increasing significantly mainly because of turmoil in the market.

The process discussed above is not the only dimension of competition putting downward pressure on platform workers' earnings. Pursuing a low-price policy, a number of DLPs compete with businesses in traditional sectors and with each other as well. Moreover, a trend has developed towards outsourcing work, both high-skilled and low-skilled, especially as traditional businesses look to DLP and tools to meet their needs for human resources. These platforms host workers from around the globe, enabling businesses to complete their tasks at a faster pace and lower price than if the tasks were performed on site (ILO, 2021, p. 44).

Earnings of platform workers are usually insufficient to serve as a primary source of income. Remuneration levels appear particularly low when converted into hourly rates and compared with national averages for standard employment involving similar tasks (De Stefano & Aloisi, 2018, p. 24). Moreover, while such

workers are usually formally paid for service provided, it is important to acknowledge “unbillable hours”. In contrast to the hours that are necessary to complete tasks, some work is time-consuming and largely “invisible”. Platform workers have to spend a considerable amount of time waiting for an order (“readiness to work”), searching for projects/tasks or upgrading skills. These activities are generally overlooked by platform owners, regulators, and sometimes even workers themselves. Berg *et al.* (2018, p. 67) estimated that on micro-task platforms for every hour spent by individuals on paid work, roughly one-third (20 minutes) of additional time is spent on searching for tasks, which is referred to as “acquisition time” (Shevchuk, Strebkov & Tyulyupo, 2021). The discrepancy between opportunities of “time sovereignty” and the real experience of time use can also be referred to as “the autonomy paradox” (Mazmanian, Orlikowski & Yates, 2013) or “the flexibility myth” (Wood *et al.*, 2019).

The mechanism presented for determining the earnings of platforms workers allows for a preliminary assessment that, at least theoretically, the business model is conducive to a situation in which workers are subject to relatively lower income than if they did the job without the mediation of platforms. This does not negate the attractiveness of this business model for workers in other respects, such as the opportunity to pursue a desired lifestyle. The earning incentive does not have to be the only or even the main one.

4. Can the Business Model of Digital Platforms Still Be Financially Attractive to Platform Workers? A Study from Poland

The most accurate way to confirm or disprove the hypothesis that starting work in the gig economy as a platform worker results in lower income would require identification of those who previously provided similar services on a different basis. How the organisation of their work changed could then be observed. It is not currently possible to conduct such a study; and not only in Poland, where platform work has not yet gained widespread popularity. In fact, empirical research on the platform economy in other countries is also fragmentary. The available data comes from the platforms themselves and usually relates to online work. Identifying workers who previously performed an identical job – under an employment contract, say – and then started cooperation with a platform is impossible.

Nevertheless, it is interesting whether the provision of services in such a model could have contributed to a change in income, and if so, in what direction the change took place. In this context, the article uses the results of research not previously conducted on Polish residents concerning the provision of online or offline services coordinated via digital platforms and their opinions on this type of activity. Designed by professor Izabela Ostoj (University of Economics in Katowice) and myself, the study examined of online and offline work coordinated via digital plat-

forms, as well as the knowledge and opinions of the respondents in the context of institutional, income and related phenomena. The study used a diagnostic survey administered via an online questionnaire. The study was commissioned to a specialised company with access to a research panel that enables a representative sample of the population of adult Poles to be selected in terms of sex, age and place of residence. The study was conducted on July 2–6, 2021.

To obtain a satisfactory number of completed questionnaires from respondents who provided services via digital platforms (over 500), the initial sample was set at 3,165 respondents, all of whom were adult Poles aged 18–70. The sample corresponded to the general population, with 51% being women and 49% men. In terms of age, 13% were aged 18–24; 23% were 25–34; 38% were 35–54; and 26% were 55–70. 38% were residents of large cities (+50,000 residents); 25% were residents of cities of up to 50,000; and 38% lived in rural areas. 41% had a higher education; 24% had a post-secondary or secondary vocational education; 21% had a general secondary education; 11% a vocational education; and 3% a lower secondary, primary or incomplete primary education.

In the first stage of the study, those respondents who had heard about the possibility of earning income through digital platforms were selected (refer back to the introduction to review how such work is organised). 66% (2,099 respondents) answered in the affirmative to this question.

The questions referred to in the article were directed only to selected respondents who, within the last year, had generated income from work (online or offline services) coordinated through digital platforms. It was assumed that this sub-population could provide detailed answers. There were 523 people, or 24% of the group of respondents who had heard about this possibility and 16.5% of the entire initial sample corresponding to the general population. Because the research was done by means of an Internet survey, among active Internet users, this figure may be regarded as slightly overestimated in relation to adult Poles in general.

In this group, online services were provided by 74% of respondents. 46% of those individuals did small crowdwork jobs and 28% projects; 30% provided offline services and 20% worked as drivers; 13% offered both online and offline services; 9% chose the answer “other”. The answers do not add up to 100% as it was possible for people to indicate a wider variety of activities.

This article presents some of the results obtained on the basis of the analysis of responses to two questions regarding a potential change in income and its scale. These were closed questions with one answer to choose from.

First, the respondents were asked whether they had experienced any change in their income after moving into gig work. 62% said they did and 26% said they did not. For 13%, gig work was their first work, so they could not remark on a change. The responses of 62% (323 individuals) who noted a change in income was the

subject of further research. In the next step, they were asked about the direction and scale of the change (“Please indicate the scale of the change in total income from the start of rendering services mediated via the digital labour platform”). The results are presented in Table 2.

Table 2. Change in Income When Moving to Providing Services on a DLP

Change in Income	Response Rate (%)	Number of Respondents
Increase by 100% or more	10	31
Increase by more than 50% but less than 100%	14	44
Increase by about 20–50%	27	86
Increase by less than 20%	35	113
Decrease by more than half	5	15
Decrease by about 50%	2	8
Decrease by less than 50% but more than 25%	3	11
Decrease by 25% or less	5	15
Total	100	323

Source: the author.

274 people (85%) saw their income increase, while only 15% observed a drop. The first group is dominated in numbers by people (35% of responses) whose earnings rose by less than 20%, followed by people who saw a 20–50% increase. The fewest number of respondents (10%) boosted their income by 100%. The earnings of 14% of Polish gig workers surged from 50% to 100%. The distribution of responses who reported a decline in income is more evenly distributed. The same number of people (5% each) indicated extreme answers – a decrease in income by more than half and by 25% or less. 2% of respondents experienced a cut in income by half and 3% reported more than 25% but less than 50%.

Thus, supplying services via DLPs contributed to an overall increase in incomes of platform workers in Poland – a surprising result given our analysis of the price mechanism, which suggested that platform workers’ incomes are relatively low. However, conclusions from the study conducted do not have to undermine the general conclusions enabled by the model. That is, the fact that income has increased does not mean that it has not remained relatively low. It is not inconceivable that many respondents’ previous jobs may have offered extremely poor pay conditions and for this reason they potentially could have observed an increase in income. Workers on platforms often struggle to find other sufficiently well-paid work to earn a decent income. They may be marginalised in “traditional” labour markets (as the disabled, refugees and migrant workers can be). Such platforms potentially offer

them more income-generating opportunities or they provide an avenue for workers to top up their earnings from low-paying or seasonal jobs. However, compared to platform workers in developing countries (ILO, 2021), those in Poland seem to be better off financially.

Summing up, using DLPs to offer one's services in Poland is beneficial for the income they can generate, at least when compared to many jobs following a more traditional model. However, the research results provide a very general picture of platform workers in Poland, and they have their limitations.

First of all, platform workers in Poland are most often people working online (74% of respondents, including 46% of whom do small crowdwork jobs and 28% projects). The Online Labour Index (OLI) would not likely bear out the study results. The OLI is constructed by tracking all the projects/tasks posted only on the five largest English-language online labour platforms. Nonetheless, it is worth referring to here. According to the OLI, the top three occupations in terms of number of people working in the field in Poland are, respectively, software development and technology, creative and multimedia, writing and translation (OLI, 2022). Even if these workers mainly perform micro-tasks and even if they compete in the global online market with contractors from developing countries, they are still better rewarded in these occupations than individuals carrying out tasks off-line (taxi drivers or deliverers). The latter are in the minority among platform workers in Poland (30% of them). This fact must also have had an impact on the results of the study.

Apart from the standard imperfections of direct research, this study has been limited by the potential impact of the pandemic. The survey was conducted when people employed in some sensitive sectors earned less or were on furlough. In such circumstances the gig economy may have created an opportunity for some. What is more, the gig economy has been functioning on the Polish labour market for only a short time, so some platform workers may not yet have made their services available there or may not be aware of the limitations of DLPs, such as the structural constraints on workers' time. They may also have failed to observe that the hourly wage is not favourable. In the survey, respondents assessed overall changes in income, not hourly wages.

5. Conclusion

The hiring of individuals for single discrete tasks, where the requester and service provider are matched via an online platform, has emerged as a business model in the global and domestic labour markets and is increasingly reshaping them. Such platforms are perceived as especially attractive for their owners, as they come without transaction costs. At the same time, the precarious working condi-

tions of contractors has led critics to attack the platforms. This dichotomy prompted reflection on whether platform workers must necessarily be an aggrieved party in these business models, with regards both to income and the Polish labour market. Although such conclusions can be drawn from a critical analysis of the literature on the subject, the empirical study conducted in Poland yielded slightly different inferences. Controversy regarding the risks of working in this segment of the economy is evident. However, the income of a majority of those who turned to DLPs actually increased – significantly in some cases. This does not mean that the general trend is one of relatively low earnings for platform workers. Rather, at a given moment in their lives and at their current position on the labour market in Poland, DLP-based work has proved relatively financially attractive. The aim of the article has been achieved and the conclusions presented herein confirm the hypothesis. Although research on platform work has grown rapidly, much remains unknown, especially in Poland. Thus, several important aspects, including the meaning of “unbilled hours”, require further investigation. A critical question that also remains unanswered is whether and to what extent new regulations should protect platform workers.

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Conflict of Interest

The author declares no conflict of interest.

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Authentic Leadership and Innovative Work Behaviour: Exploring the Role of Trust, Power Distance Orientation, and Job Satisfaction

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ABSTRACT

Objective: In today's rapidly evolving business landscape, the role of authentic leadership in fostering innovative work behaviour among employees has gained significant attention. This paper explores and analyses authentic leadership's influence on innovative work behaviour. Furthermore, it examines the mediation role of trust in leaders and the moderation role of power distance orientation and job satisfaction within this relationship.

Research Design & Methods: A systematic literature review was conducted to identify relevant studies on authentic leadership, innovative work behaviour, trust, power distance orientation, job satisfaction, and their interrelationships. The selected studies were critically analysed to identify common themes, methodologies, and findings. We employed the PRISMA method to choose the papers and bibliometric analysis was performed through VOS viewer software.

Findings: We provide insights into how authentic leadership influences employees' innovative work behaviour by examining relevant literature. This paper also provides research gaps based on

existing literature and empirical research. The review integrates and analyses existing literature to provide insights into the relationships between the variables.

Implications/Recommendations: Organisations should prioritise developing authentic leaders who build trust and create a supportive environment for innovation. Fostering a culture of low power distance and employee involvement enhances the positive impact of authentic leadership on innovation. Additionally, improving job satisfaction through various strategies promotes an innovative work environment.

Contribution: As far as we know, prior studies have not investigated how job satisfaction and power distance orientation influence the connection between authentic leadership and innovative work behaviour. This paper contributes to the literature by providing insights into the intervening roles of job satisfaction and power distance orientation in the unique context of Pakistani start-ups.

Article type: original article.

Keywords: authentic leadership, innovative work behaviour, trust in leaders, power distance orientation, job satisfaction, Pakistani start-ups.

JEL Classification: M1, M10.

1. Introduction

As the business landscape evolves at an accelerating pace, innovation is becoming a key source of organisational success and competitiveness (Škerlavaj *et al.*, 2019). Start-ups, with their entrepreneurial spirit and flexibility, are particularly well-positioned to foster innovative work behaviour among their employees (Sengupta, Sharma & Singh, 2021). However, fostering innovation requires effective leadership that inspires and motivates employees to think creatively, take risks, and implement novel ideas (Hughes *et al.*, 2018). One leadership style that has attracted attention in recent years for its potential impact on innovative work behaviour is authentic leadership (Hu *et al.*, 2018).

In light of fraudulent activities and unethical behaviour within corporations, there has been a shift in research focus towards examining how authentic leadership affects the outcomes experienced by employees (Semedo, Coelho & Ribeiro, 2017; Ribeiro, Duarte & Filipe, 2018). The concept of authentic leadership (AL) is a recent development within the realm of leadership research. It emphasises leaders' ability to be genuine, self-aware, and transparent in the way they interact with employees (Walumbwa *et al.*, 2008). Authentic leaders create an environment that inspires employees to express their true selves, take ownership of their work, and engage in innovative behaviours. By fostering a climate of trust and openness, authentic leaders empower employees to challenge the status quo, think outside the box, and explore new possibilities (Avolio *et al.*, 2004; Zhou & Verburg, 2020).

Although previous studies have expanded our understanding of the aspects that contribute to innovative work behaviour (IWB), there remain several areas that require attention. The research on IWB specifically within the realm of start-ups is notably lacking (Munir & Beh, 2019; Li, Makhdoom & Asim, 2020; Zhou & Verburg, 2020). Numerous research investigations have focused on leadership styles as a significant factor influencing innovative work behaviour. However, these studies have mainly focused on transformational leadership styles, overlooking newer leadership approaches (Al-Husseini & Elbeltagi, 2016). While both types of leadership, transformational and authentic, are significant factors in stimulating employees' IWB, authentic leadership has a greater influence than transformational leadership (Korku & Kaya, 2023). Azinga *et al.* (2023) asserted that further investigation is required to confirm the correlation between AL on IWB, as well as identify the possible variables that may mediate or moderate this relationship. Furthermore, Kafeel, Khan and Ahmed (2024) stated that power distance can be used as a contextual variable affecting the association between AL and IWB. As far as we know, prior studies have not investigated how job satisfaction and power distance orientation (PDO) influence the connection between AL and IWB.

The main focus of this study is to address the above-mentioned gaps by examining how AL influences the IWB of employees in start-ups located in Pakistan. The study also takes into account the mediating influence of trust in leaders, as well as the moderating impacts of power distance orientation and job satisfaction.

This research will contribute to the existing knowledge base in various ways. Firstly, it will provide valuable insights into the association between AL and IWB in the unique setting of Pakistani start-ups. Understanding how AL influences employees' propensity to engage in innovative behaviours can help start-up leaders and managers in fostering a culture of innovation and enhancing overall organisational performance. Secondly, by exploring the mediation role of trust in leaders, this study will shed light on the underlying mechanisms through which AL influences IWB. This knowledge can help leaders understand the importance of building trust with their employees and the impact it has on fostering a conducive environment for innovation. Thirdly, the study will explore the moderating role of PDO. By examining how cultural factors influence the association between AL and IWB, the research will provide insights into how leaders can navigate cultural nuances and tailor their leadership approaches to encourage innovation in start-ups operating in high power distance cultures like Pakistan. Lastly, the study will investigate the moderating role of job satisfaction, which has been recognised as a crucial factor in impacting employee attitudes and behaviours. Understanding the interplay between authentic leadership, job satisfaction, and IWB will have practical implications for start-up leaders to enhance employee satisfaction, motivation, and engagement in innovative activities.

2. Methodology

2.1. Overview of Methodology

The purpose of conducting a literature review is to pinpoint areas of research that have not been adequately addressed. We employed the PRISMA method to choose the papers, illustrated in Figure 1. The PRISMA method comprises identification, screening, eligibility, and inclusion. Furthermore, bibliometric analysis was carried out to comprehend the knowledge domain pertaining to authentic leadership and innovative work behaviour.

2.2. PRISMA Method

Identification

In the process of identification, we conducted a systematic literature review by searching electronic databases, including Google Scholar, Web of Science, PsycINFO, Scopus, Emerald Insight, Sage, Wiley, Science Direct, Springers, and Taylor and Francis databases using the keywords “authentic leadership”, “innovative work behaviour”, and “mediation” or “moderation”. After searching electronic databases, we identified 315 papers and removed 90 papers due to duplication.

Screening

The studies had to comply with the following criteria for inclusion: (a) they had to be published in peer-reviewed journals and (b) they had to be written in English, (c) investigating the connection between AL and IWB, and (d) reporting the mediation or moderation effects of other variables on this relationship. After screening the abstracts against the criteria, 60 papers were excluded, and 26 more were excluded after screening the full text of the abstracts.

Eligibility

During this stage, we manually checked the articles to verify that all those remaining (following the screening process) fulfilled the necessary criteria. The full text of the papers was assessed for eligibility, and after assessing the full text, 23 papers were excluded.

Inclusion

After screening the titles, abstracts, and full texts of the identified articles, we selected 76 studies that met the inclusion criteria for this systematic literature review (Fig. 1).

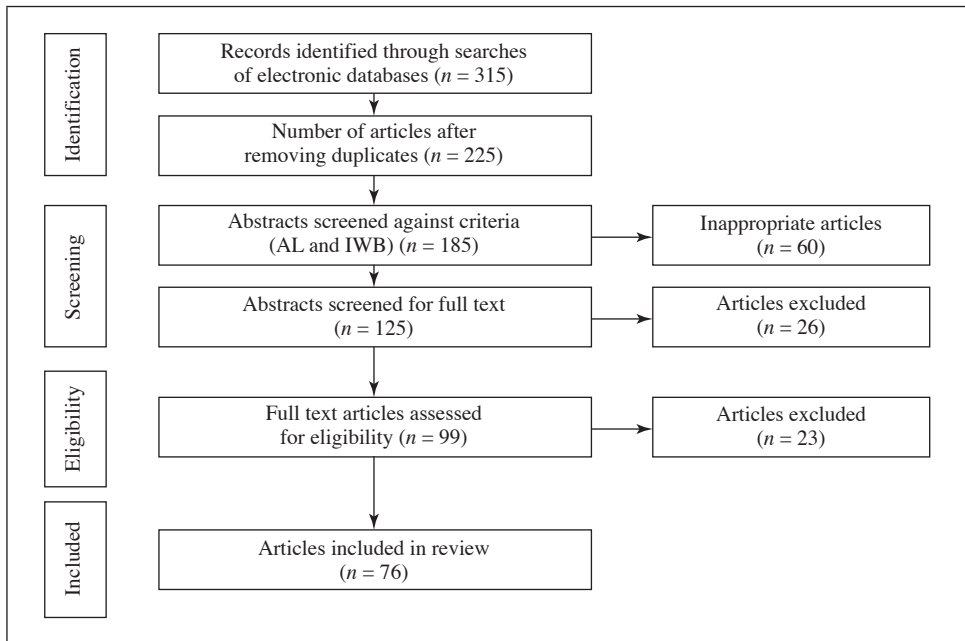


Fig. 1. A Prisma Flow Chart Illustrating the Selection Process for Articles

Source: the authors.

2.3. Bibliometric Analysis

Bibliometric analysis offers a means to efficiently map extensive scientific literature (González-Torres *et al.*, 2020). It employs methods akin to systematic literature reviews, ensuring the quality of information and resulting outputs (Tang *et al.*, 2018). Utilising VOS viewer software, we established and visualised connections among bibliometric sources, top authors, and refined data from various publications, scholars, and journals (Hallinger & Nguyen, 2020). This software is widely used for conducting bibliometric research (Costa *et al.*, 2017). Researchers commonly utilise it to visualise and build bibliometric networks.

We commenced the analysis with the authors' keywords as shown in Figure 2. Frequency of occurrence indicates how often a keyword appears in the dataset. Total link strength measures the strength of association between keywords based on co-occurrence. Authentic leadership is the most frequently occurring keyword and has the highest total link strength as indicated in Table 1, indicating its significance and centrality in the dataset. Performance and Impact also occur frequently and are strongly linked keywords, suggesting their importance in the literature. Organisational citizenship behaviour has the lowest link strength among the top 10 keywords, indicating it may have fewer connections with other keywords in the dataset.

Table 1. Analysis of Keywords

S. No.	Keyword	Occurrences	Total Link Strength
1	Authentic leadership	141	281
2	Performance	113	261
3	Impact	105	240
4	Model	96	150
5	Innovative work behaviour	91	90
6	Employee creativity	85	113
7	Member exchange	79	120
8	Creative self-efficacy	76	109
9	Work behaviour	71	126
10	Organisational citizenship behaviour	64	84

Source: the authors.

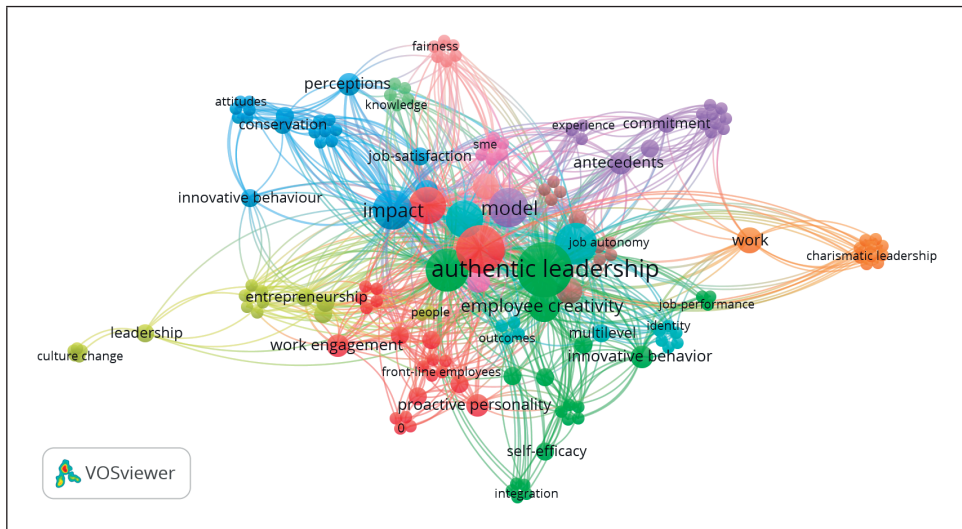


Fig. 2. Network Visualisation Map of the Author Keywords

Source: the authors.

Matej Cerne has the highest number of citations (182) among the authors as shown in Table 2, indicating significant impact and recognition in the field. Marko Jaklic and Miha Skerlavaj share the second-highest number of citations (128 each), suggesting comparable contributions. The total link strength varies among authors, indicating their level of collaboration within the academic community. Authors like

Alon Lisak, Yang Sui, and Miriam Erez have notable link strengths despite not having the highest citation counts as demonstrated in Figure 3.

Table 2. Citations per Author

S. No.	Author	Citations	Total Link Strength
1	Cerne, Matej	182	54
2	Jaklic, Marko	128	39
3	Skerlavaj, Miha	128	39
4	Lee, Cythia	55	12
5	Lisak, Alon	55	26
6	Sui, Yang	55	19
7	Erez, Miriam	55	8
8	Grah, Barbara	54	13
9	Groselj, Matej	54	17
10	Penger, Sandra	44	9

Source: the authors.

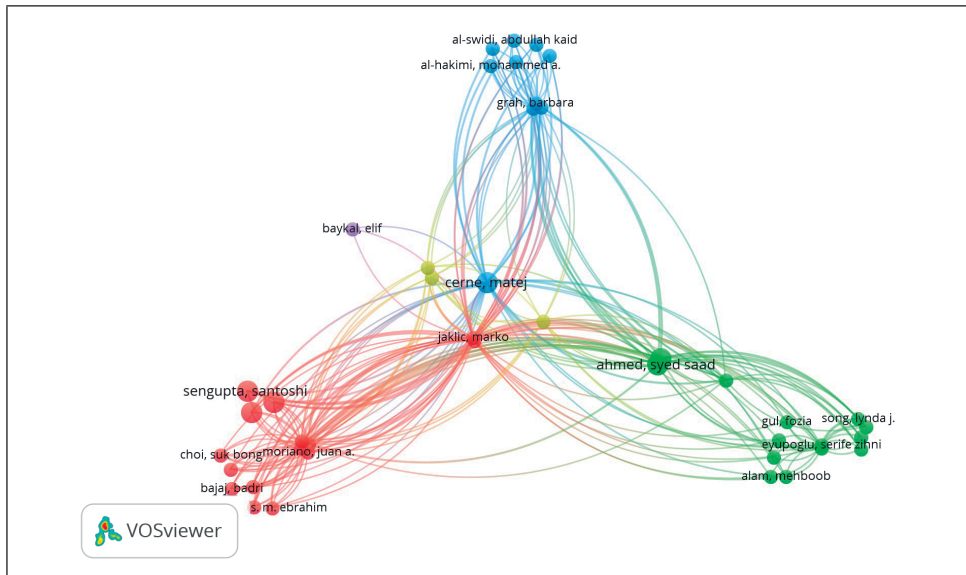


Fig. 3. Network Map of the Most Cited Authors in Research

Source: the authors.

The country with the highest number of total citations is Slovenia (182), followed by Norway (137) and the People’s Republic of China (103) as shown in Table 3. The People’s Republic of China has the highest total link strength (51), followed

by Norway (25) and Slovenia (24) as shown in Figure 4. The analysis indicates that while Slovenia has the highest total citations, the People’s Republic of China stands out in terms of both average citations per author and total link strength. This suggests that while Slovenia may have fewer authors, they receive a higher number of citations on average, whereas the People’s Republic of China has a larger number of authors with significant link strength.

Table 3. Country-wise Collaboration of Authors

S. No.	Country	Citations	Total Link Strength
1	Slovenia	182	24
2	Norway	137	25
3	People’s Republic of China	103	51
4	USA	58	17
5	Israel	55	9
6	Spain	31	19
7	Netherlands	30	25
8	Poland	21	21
9	India	19	24
10	Australia	16	8

Source: the authors.

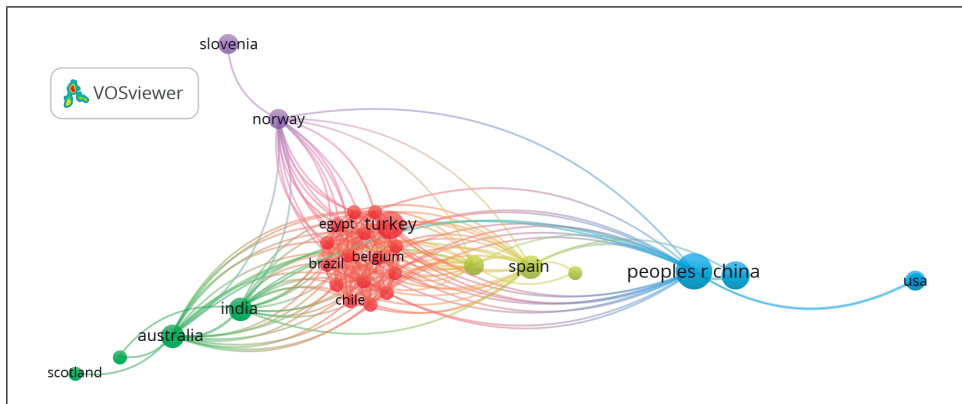


Fig. 4. Co-authorship at the Country Level

Source: the authors.

The visualisation shows the citations and link strength for each document in the dataset (Fig. 5). It helps to identify influential documents and understand the network of citations. From the analysis, we can see that “Cerne (2012)” has the

highest number of citations and considerable link strength as shown in Table 4, indicating its significance in the network of citations. “Lisak (2016)” and “Groselj (2021)” also have numerous citations, while “Lisak (2016)” lacks link strength compared to others.

Table 4. Citations per Document

S. No.	Document	Citations	Total Link Strength
1	Cerne (2012)	128	12
2	Lisak (2016)	55	0
3	Groselj (2021)	54	6
4	Zhang (2018)	31	2
5	Laguna (2019)	21	6
6	Yamak (2021)	14	4
7	Bracht (2023)	9	0
8	Sengupta (2023)	7	2
9	Khan (2021)	6	5
10	Gelaidan (2023)	6	2

Source: the authors.

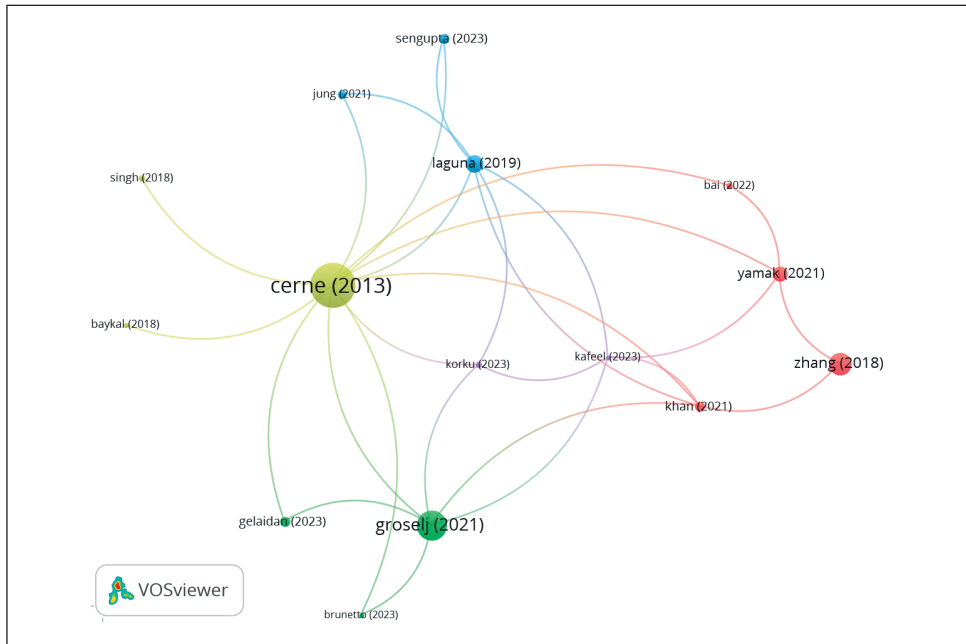


Fig. 5. Citations Concerning Each Document

Source: the authors.

Table 5. Top 10 Universities in the Dataset by Number of Affiliated Documents Published

S. No.	Organisation	Document	Total Link Strength
1	University of Ljubljana	2	34
2	Bahria University	2	15
3	Jaypee Institute of Information Technology	2	9
4	BI Norwegian Business School	1	25
5	Centre of Excellence for Biosensors, Instrumentation and Process Control	1	25
6	Erasmus University Rotterdam	1	14
7	John Paul II Catholic University of Lublin	1	14
8	National Distance Education University	1	14
9	Near East University	1	9
10	Hacettepe University	1	8

Source: the authors.

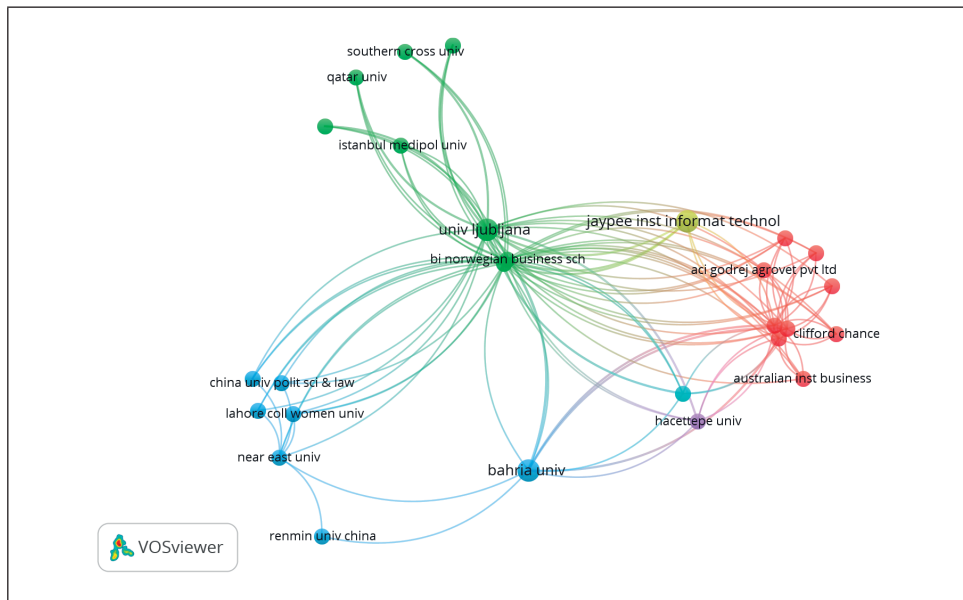


Fig. 6. Affiliations of Universities by Documents Published

Source: the authors.

The University of Ljubljana has the highest total link strength (34) as shown in Table 5 and Figure 6, indicating strong collaboration or influence in academic publi-

cations. BI Norwegian Business School and Centre of Excellence for Biosensors, Instrumentation and Process Control have the same link strength (25), suggesting a similar level of collaboration. Near East University and Hacettepe University have relatively lower link strengths (9 and 8 respectively), indicating lesser involvement or influence in the analysed publications.

3. Literature Review and Hypotheses Development

3.1. Authentic Leadership and Innovative Work Behaviour

TL promotes an organisational culture that motivates individuals to transition from a self-oriented perspective to one that centres around a shared goal. Studies indicate that the creation and implementation of employee-generated ideas, fostered and facilitated by leaders, significantly contribute to the innovation process (Echebiri & Amundsen, 2021). Prior research findings reveal that AL has a favourable effect on the employees' IWB (Černe, Jaklič & Škerlavaj, 2013; Niu *et al.*, 2018); because authentic leaders play a vital role in fostering employee voice behaviour by offering psychological support and creating an environment of psychological safety. This is accomplished by being transparent, engaging in open communication, and providing support to their employees. In the realm of start-ups, it is crucial for the founder-leader to foster a culture of innovative work behaviour among their staff, as it greatly contributes to the long-term viability of the start-up and enhances its competitive advantage (Sengupta, Sharma & Singh, 2021). Moreover, empirical evidence indicating a connection between AL and IWB exists (Grošelj *et al.*, 2021; Yamak & Eyupoglu, 2021). Given the reasoning provided above, we put forward the hypothesis that:

H1: Authentic leadership is positively associated with employees' IWB.

3.2. Authentic Leadership, Trust, and Innovative Work Behaviour

Gardner *et al.* (2005, p. 363) argued that AL “focuses on the formation of authentic relationships between the leader and followers that are characterised by trust and integrity”. Authentic leaders possess self-awareness regarding their strengths and limitations, and they openly display their true selves, genuine thoughts, and emotions to their followers in order to foster trust and create a sense of mutual trust within the work environment (Wei *et al.*, 2018). By using such characteristics and behaviours, authentic leaders have the ability to build trust with their subordinates (Agote, Aramburu & Lines, 2016). Trust in leaders plays a crucial role in the association between AL and IWB. When employees view their leaders as trustworthy, they are more likely to get involved in risk-taking behaviour and share their innovative ideas (Lei, Nguyen & Le, 2019). Authentic

leaders, by displaying transparency, honesty, and ethical behaviour, build trust with their employees, which, in turn, promotes the exchange of innovative ideas and experimentation (Avolio *et al.*, 2004; Gardner *et al.*, 2021). In order to foster a culture of trust within the organisation and create a suitable working atmosphere, it is imperative for leaders to show respect toward their colleagues and followers (Lis, Glińska-Noweś & Kalińska, 2014). For instance, when leaders demonstrate comprehension and respect towards their employees, it often results in enhanced innovative work behaviour and involvement in organisational affairs. This is due to employees perceiving themselves as valuable to the organisation, fostering greater trust and collaboration within the workplace (Meng, 2015). Furthermore, it is believed that trust strengthens commitment to the organisation (Lewicka *et al.*, 2023), as authentic leadership fosters a transparent work environment that enhances employee trust, thereby encouraging innovative work behaviour. Drawing from the above-mentioned rationale, we hypothesise that:

H2: Authentic leadership is positively associated with trust in leaders.

H3: Trust in leaders is positively associated with IWB.

H4: Trust in leaders mediates the positive association between AL and IWB.

3.3. Authentic Leadership, Power Distance Orientation, and Innovative Work Behaviour

Power distance orientation (PDO) pertains to how individuals in a society or organisation acknowledge and anticipate disparities in power (Hofstede, 1980). Asian countries, specifically the subcontinent consisting of Bangladesh, Pakistan, and India, exhibit a cultural inclination towards high power distance and collectivism, where hierarchy plays a significant role in defining boundaries. Within this context, disparities exist between managers and employees (Robert *et al.*, 2000; Mujtaba, Afza & Habib, 2011). This kind of culture affirms a leader's connection with their subordinates in a way that the subordinates find valuable (Chen & Farh, 1999). In line with this perspective, AL could potentially be the most suitable option. We contend that in a culture characterised by a significant power distance, where managers possess most of the power and have high expectations for performance, authentic leaders exert their influence on team members by exemplifying positive behaviours, fostering a sense of autonomy, and promoting a process of identification to achieve beneficial outcomes. Among these outcomes, innovative work behaviour is particularly significant (Amabile *et al.*, 2004; Mujtaba, Afza & Habib, 2011). In a high-power distance culture like Pakistan, where hierarchical relationships are valued and respected, employees may be less likely to challenge their superiors' ideas or take the initiative (Hofstede, Hofstede & Minkov, 2005; Hofstede, 2011).

Thus, the impact of AL on employees’ IWB may be weakened in high power distance cultures. Based on the given rationale, we state the hypothesis that:

H5: PDO moderates the positive association between AL and followers’ IWB in such a way that the association is weaker when the PDO is high and stronger when the PDO is low.

3.4. Authentic Leadership, Job Satisfaction, and Innovative Work Behaviour

Job satisfaction refers to “the pleasurable emotional state resulting from the appraisal of one’s job as achieving or facilitating the achievement of one’s job values” (Locke, 1976, p. 1300). In scientific literature, there is a substantial correlation between AL and job satisfaction, considering the various measurable results associated with leadership (Walumbwa *et al.*, 2008; Giallonardo, Wong & Iwasiw, 2010; Wong & Laschinger, 2013; Lindsay & Mathieson, 2022). Job satisfaction is an important factor that may moderate the connection between AL and IWB. Satisfied employees are more inclined to feel motivated, committed to their work, and engaged, leading to higher levels of innovation. Authentic leaders, by creating a favourable work environment and fostering supportive relationships, can enhance employees’ job satisfaction. Consequently, job satisfaction may strengthen the association between AL and employees’ IWB. In the realm of AL and IWB, Azinga *et al.* (2023) emphasised the importance of including job satisfaction in future research endeavours. Based on the reasoning stated above, we put forward the hypothesis:

H6: Job satisfaction moderates the positive association between AL and followers’ IWB in such a way that the association is weaker when job satisfaction is low and stronger when job satisfaction is high.

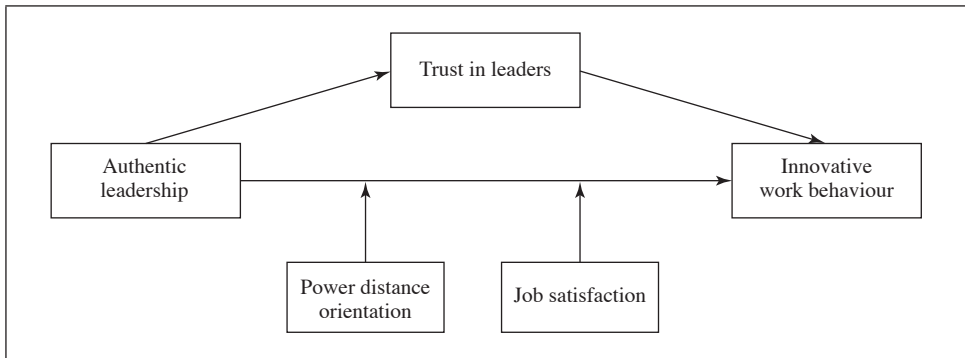


Fig. 7. Proposed Research Model

Source: the authors.

4. Measurement Scales

The details of the scales to be utilised in the study are illustrated in Table 6. The measurement of all the items will be conducted using a Likert scale consisting of five points, where a rating of 1 indicates “strongly disagree” and a rating of 5 indicates “strongly agree”.

Table 6. Measurement of the Variables

Variable	Numbers of Items	Developed by	Reason to Choose	Adapted by Studies
Authentic leadership	16	Walumbwa <i>et al.</i> (2008)	The scale has been extensively utilised in various settings, such as China, India, Pakistan, Cyprus, and Portugal, and has demonstrated a high level of reliability	Semedo, Coelho & Ribeiro (2017, 2018), Khan, Ahmed & Khan (2021), Lei <i>et al.</i> (2021), Yamak & Eyupoglu (2021), Bai <i>et al.</i> (2022), Sengupta <i>et al.</i> (2023), Kafeel, Khan & Ahmed (2024)
Innovative work behaviour	10	De Jong & Den Hartog (2010)	Hughes <i>et al.</i> (2018) recently recommended the utilisation of this scale, which has demonstrated strong reliability in previous research studies	Javed, Khan & Quratulain (2018), Grošelj <i>et al.</i> (2021), Khan, Ahmed & Khan (2021), Gelaidan, Al-Swidi & Al-Hakimi (2023), Sengupta <i>et al.</i> (2023), Kafeel, Khan & Ahmed (2024)
Trust	12	Nyhan & Marlowe (1997)	The Organizational Trust Inventory (OTI) is a reliable and accurate tool consisting of 12 items, created with the purpose of evaluating an individual’s trust level towards their supervisor and the organisation as a whole. Trust in the supervisor was assessed through items 1–8, while trust in the overall organisation was evaluated using items 9–12. The instrument exhibited high reliability, with coefficient alphas ranging from 0.95 to 0.96 (Nyhan & Marlowe, 1997)	Joseph & Winston (2005), Vigoda-Gadot & Talmud (2010), Cho & Song (2017), Ilyas, Abid & Ashfaq (2020), Berraies, Hamza & Chtioui (2021)

Table 6 cont'd

Variable	Numbers of Items	Developed by	Reason to Choose	Adapted by Studies
Job satisfaction	5	Brayfield & Rothe (1951)	This scale has been confirmed and validated by Abbas <i>et al.</i> (2014) and recently recommended by Ekmekcioglu and Nabawanuka (2023)	Judge & Ilies (2004), Rahman <i>et al.</i> (2020), Aboramadan, Dahleez & Hamad (2021), Chanana (2021), Aruldoss <i>et al.</i> (2022)
Power distance orientation	6	Dorfman & Howell (1988)	The effectiveness of this scale has been proven in various studies and has recently been recommended by Zhang <i>et al.</i> (2022)	Ahmad & Gao (2018), Peltokorpi (2019), Siddique, Siddique & Siddique (2020), Han & Jiang (2022), Wu <i>et al.</i> (2022)

Source: the authors.

5. Discussion

This study focuses on the influence of authentic leadership on innovative work behaviour in the context of start-ups in Pakistan. The literature review highlighted the gaps in existing research, emphasising the need for a deeper understanding of AL's impact on IWB, especially in the unique setting of start-ups, and the mediating and moderating factors involved.

The literature review and hypotheses development section established a foundation for the study. Hypotheses were formulated based on existing knowledge, filling gaps in the literature, and addressing specific contextual factors such as trust in leaders, power distance orientation, and job satisfaction. The proposed research model, illustrated in Figure 7, provides a comprehensive framework for investigating the relationships between AL, trust, PDO, job satisfaction, and IWB.

The methodology section outlined the systematic literature review process, employing the PRISMA method for article selection and conducting bibliometric analysis. The use of VOS viewer software facilitated the identification of influential authors, countries, documents, and affiliations in the field of AL and IWB. This rigorous approach enhances the reliability and validity of the study's findings.

The findings of this systematic literature review have several theoretical and practical implications. Theoretical implications include advancing our understanding of the nuanced relationships between AL, trust, PDO, job satisfaction, and IWB. Theoretical frameworks such as cultural dimensions theory provide valuable insights into these dynamics. Moreover, the identification of mediation and moderation effects contributes to the refinement of existing theoretical models in leadership and IWB research.

In practical terms, the findings underscore the significance of fostering authentic leadership practices in organisations, particularly in start-up contexts. Leaders and managers can leverage AL principles to cultivate trust, empower employees, and create an environment conducive to innovation. Understanding cultural nuances, such as PDO, enables leaders to tailor their approaches and effectively promote innovation across diverse contexts. Moreover, prioritising employee satisfaction enhances organisational resilience and fosters a culture of continuous innovation.

This study has several limitations. The systematic literature review is based on the papers available in selected databases. There may be relevant studies that were not included in the analysis due to publication bias or limitations in database coverage. The omission of certain studies could influence the comprehensiveness and representativeness of the literature review. While bibliometric analysis provides insights into the scholarly landscape, it has limitations. It relies on the availability of indexed literature and may not capture all relevant studies. Additionally, citation counts may not fully reflect the impact or quality of a publication. The study primarily focuses on English-language literature, potentially excluding valuable contributions in other languages. This limitation may introduce language bias, and relevant research in local languages may offer additional perspectives. The study design is based on a systematic literature review, and the proposed research model is conceptual. The lack of empirical data and the cross-sectional nature of the study limit the ability to establish causal relationships. The study relies on existing measurement scales for variables such as authentic leadership, trust, power distance orientation, job satisfaction, and innovative work behaviour. The appropriateness of these scales may vary across different cultural and organisational contexts. Further validation and customisation of measurement tools for the specific context of Pakistani start-ups are essential.

While this study aims to address critical gaps in the literature, it also opens avenues for future research. The proposed research model could be further validated through empirical studies, considering the dynamic nature of start-up environments. Consider a multilevel analysis approach to understand the impact of AL on IWB at both individual and team levels within start-ups. Explore how team dynamics and interpersonal relationships influence the relationship between authentic leadership and IWB. Additionally, exploring the influence of other contextual factors on the relationships identified in this study could contribute to a more comprehensive understanding of AL and IWB in start-ups.

6. Conclusion

Overall, this paper underscores the importance of AL in Pakistani start-ups for fostering employees' IWB. It highlights the mediation role of trust in leaders and the moderation roles of PDO and job satisfaction. It is crucial to take into account the contextual factors of PDO and job satisfaction to maximise the effectiveness of AL

practices. By understanding these dynamics, organisations can cultivate authentic leadership practices, build trust, create a supportive work environment, and enhance job satisfaction, ultimately promoting a culture of innovation and propelling the success of start-ups in Pakistan. Organisations should invest in developing authentic leaders who demonstrate integrity, transparency, and ethical behaviours. They should also strive to create an environment that nurtures trust, reduces power distance, and enhances job satisfaction. By doing so, start-ups can unlock the full potential of their employees, encourage innovative thinking, and gain a competitive edge in today's dynamic business landscape. Further research in this area is warranted to explore additional factors and contexts that may influence the association between AL and IWB in start-up settings.

Authors' Contribution

The authors' individual contribution is as follows: Dagmara Lewicka 30%, Hafeez Ur Rehman 70%.

Conflict of Interest

The authors declare no conflict of interest.

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Modelling Accelerating Acquisition of Teamwork Competences with Transversal Competences and Artificial Intelligence

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ABSTRACT

Objective: The purpose of this paper was to develop a model for accelerating the acquisition of the selected transversal competence of teamwork. Based on data from four EU countries, four models were developed and the best of them was selected, describing the results and variables relevant to that model.

Research Design & Methods: Data on improving transversal competences were collected from students in four countries, i.e. Poland, Slovakia, Slovenia and Finland. 26 variables were taken into account in the modelling which was based on four methods. They included the Multiple Linear Regression Model, Multivariate Adaptive Regression Splines, Support Vector Machine and two Artificial Neural Network methods.

Findings: The analyses show that the method of educating students and young employees, e.g. during training courses, can be a catalyst for accelerating teamwork competence acquisition. Other transversal competences including creativity, communicativeness and entrepreneurship correlate positively with growth in teamwork competence.

Implications/Recommendations: The study was conducted on an international group, also taking into account cross-cultural variables. However, to deepen the results, it is suggested that the sample size be increased and the research updated. The ranking of the education method is indicated to have an impact on the growth of transversal competences, including teamwork.

Contribution: New approaches in the paper include the analytical approach to modelling the growth in teamwork competence in relation to many variables describing students and young workers in the labour market in the UE. The use of multiple analytical and statistical methods allows the most fitting model to be selected and the error to be minimised.

Article type: original article.

Keywords: teamwork, creativity, communicativeness, entrepreneurship, transversal competences, competencies.

JEL Classification: O15, M52, M2, M12.

1. Introduction

Ongoing technological developments and changes in the economy are forcing employees to continuously improve their competences (Jakubiak, 2017). The process of improving competences is directly linked to formal and informal education. Therefore, acquisition of skills should be planned and rationally implemented, for example, within the framework of education and training courses, a career path, or an employee competence development plan (Nosalska & Gracel, 2019) that are in place in the company. Knowledge of how to improve and accelerate competence enhancement is key in this area.

In the context of human resource management in companies, the assessment of employee competences is an essential part of the process of improving employee

skills and, consequently, it is crucial in developing human potential in the organisation (Jędrzejczyk, 2017). It is important not only to be aware of one's competences but also to deepen one's knowledge of the competence-related needs in the labour market and to continuously improve them. Therefore, concepts that are currently relevant include lifelong learning. It represents a new perspective on an employee's career development (Solarczyk-Ambrozik, 2016). The idea sets new paths and directions for the development of the individual's competences. In addition, the competences that enable cooperation among many people, i.e. the ability to work in a team, are gaining in importance (Krawczyk-Blicharska, 2021). What employers currently desire most is the improvement of transversal competences (Graczyk-Kucharska *et al.*, 2019) as that has an important link with employability, especially for young people who are entering the labour market (Calero López & Rodríguez-López, 2020). Even though transversal competences contribute to future career success, their development is not an easy process (Sá & Serpa, 2018). At the beginning of the century, Wood and Payne (2006) pointed out that competences that are useful in the workplace include communication skills, the ability to work in a team, the ability to think analytically or the ability to solve problems. If these skills are important, how can we accelerate their development?

The issue of teamwork is important in the context of current social challenges in the context of management (Dimdiňš, Miltuze & Oļesika, 2022). Teamwork allows people with different skills and viewpoints to work together on modern problems, it utilises and merges the abilities of team members. Teamwork demands utilisation of a social skill (Goliński, Spychała & Miądowicz, 2022) and often requires face to face interactions and alignments regarding time and space (Wildman *et al.*, 2021). These circumstances can force employees to quickly improve their competences and can also influence other skills (Huang, 2022). There is a lack of analyses of teamwork competences in the context of other transversal competences (Graczyk-Kucharska *et al.*, 2020). There is also a shortage of methods used such as AI in researching this issue.

The Poznan University of Technology's Technical Knowledge Accelerator initiative aims to undertake and initiate actions meant to accelerate the development of the professional competence of employees. The initiative saw the launch of a project entitled "Method for accelerating the development of transversal competences in the process of practical education of students" for the purposes of the analysis of and research into the improvement of competences such as entrepreneurship, communicativeness, teamwork and creativity (Graczyk-Kucharska *et al.*, 2019). Research into the project was conducted with partners from Poland, Finland, Slovakia and Slovenia (Graczyk-Kucharska *et al.*, 2020). The project developed and tested five selected processes for accelerating the acquisition of transversal competences as described in more detail in other publications (Szafranski, Goliński & Simi, 2017).

This paper aims to develop a mathematical model for accelerating the acquisition of the transversal competence of teamwork. An additional objective is to verify different statistical analysis methods for the development of a model explaining the acceleration of the development of teamwork competences. Methods that were used to analyse the impact of and interdependence between factors influencing the rate of acceleration of the acquisition of this competence included the Multiple Linear Regression Model (MLRM), Multivariate Adaptive Regression Splines (MARS), Support Vector Machine (SVM) and Artificial Neural Network (ANN).

The chosen methods are popular statistical methods which will enable reliable development of models created using data from four countries (Poland, Slovakia, Slovenia and Finland) and 26 variables analysed in the process of improving and accelerating competence acquisition. The specifics of the data are described in the later part of the paper. Using the multiple linear regression method, it is possible to analyse to what extent different data are interrelated. The MARS method is a regression method that can be considered an extension of the linear model – it makes it easier to understand the behaviour of complex systems and to analyse and interpret the results of analyses. In recent years, MARS has been increasingly used in many fields of science, finance and economics. Therefore, a decision was made to test the possibility of using it in the area of competence management. The SVM method consists of models with learning algorithms that analyse the data for classification and regression analyses. ANN is a system designed to process information. Its most important feature is its ability to learn from data and generalise knowledge.

The development of the model for teamwork competence is intended to answer the following research problem: which variables influence the acceleration of the development of the transversal competence of teamwork? The 26 variables that were collected and classified during the study were included in further analyses. They are discussed in detail in the further part of the article. The results of the study present and compare four selected models that were developed using the various aforementioned methods. The further part of the paper discusses them, summarises the research work and identifies directions for further research.

2. Literature Review

2.1. Characteristics of the Term “Competence”

Literature offers many definitions of the term “competence”, as is frequently the case with concepts that derive from social fields (Springer, 2018). Competences can be defined as a combination of knowledge, skills and attitudes appropriate to the situation and necessary to achieve societal goals (European Parliament and Council, 2006). Mansfield defines competences as the set of qualities that an employee possesses by which he or she achieves the intended outcomes at work

(Mansfield, 1999). Competences are also understood as personal qualities that contribute to the adequate performance of work and the proper functioning of the organisation (Dudzińska-Głaz, 2012). According to Filipowicz, competences are dispositions in terms of knowledge, skills and attitudes that enable one to perform professional tasks at an appropriate level (Filipowicz, 2019).

Competences are most often classified into two groups (Jagodziński, 2013):

- soft competences, also known as social competences, which include interpersonal skills, personality traits, approaches and attitudes,
- hard competences, also known as specialised competences, which include industry knowledge and knowledge and skills in the practical application of programmes and tools.

There are two perspectives on the perception of competences. The first (the behavioural one) refers to skills and dispositions that go beyond cognitive abilities, i.e. self-awareness and social skills. Unlike intelligence or personality, they can be acquired through exercise and development (Le Deist & Winterton, 2005). The second perspective (the functional one) defines competences as the characteristics of people who perform particular work or activities effectively and correctly. It is worth noting that it is a very broad definition as it includes traits, social roles, motives or knowledge resources, therefore it is not clear what it specifically refers to (Elkin, 1991; Robotham & Jubb, 1996). In the context of competences, there are many instances of adding further detail to the concept. One of them refers to transversal competences.

2.2. Transversal Competences

Another division of competences according to their typology distinguishes between transversal and technical competences (Sá & Serpa, 2018). Technical competences include the specialist knowledge and skills required for a particular job (Szafranski, Goliński & Simi, 2017). As the requirements may be different in different workplaces, these skills cannot always be used in every workplace. Transversal competences do not have a fixed definition, however, they can be described as those required for different jobs, in different industries and fields (Muhidova, 2022). Defined competences make it easier for us to find employment and function more easily in society. It is pointed out that the development of transversal competences is crucial as they are the ones that make it possible to form relations with the environment, an entrepreneurial attitude, and an ability to work creatively and solve problems (Szafranski, Goliński & Simi, 2017). In 2013, transversal competences were described by UNESCO as skills such as critical thinking, interpersonal skills and innovative thinking. Pârvu and Ipate believe that transversal competences also include values and attitudes that are appreciated in different fields and at each stage of a career (see: Sá & Serpa, 2018). Transversal competences are skills that anyone

can acquire and those that can later be continuously improved (Belchior-Rocha, Casquilho-Martins & Simões, 2022). Increasingly, transversal competences such as good work organisation and self-discipline are required of employees by prospective employers. An employee with transversal competences can adapt more easily to a new job and their daily tasks. Other important competences are teamwork, creativity and problem solving (Sá & Serpa, 2018). Specific skills make it easier to work or carry out tasks and that allows companies to derive additional benefits. Teamwork is one of the most important skills for employers who are looking for employees (Graczyk-Kucharska *et al.*, 2020).

There is a very large gap between the expectations of future employers and the opportunities for students to learn and develop transversal competences at universities (Serrano *et al.*, 2011). Most universities focus on technical competencies, which are still very important and appreciated, however, without transversal competences they are not as attractive in themselves (García-Álvarez *et al.*, 2022). Often, due to the lack of or limited budget for further training of new employees, companies are only interested in workers who already have transversal competences (Diaconu, Dutu & Georgescu, 2015). Such an employee can adapt to a new workplace, easily start working in a team and, in conjunction with other competences like creativity, offer many ideas and new solutions (Diaconu, Dutu & Georgescu, 2015). The literature indicates and emphasises the importance of improving transversal competences during education, in parallel with the development of technical competences using various educational methods. However, literature sources lack mathematical models to describe the dependencies inherent to students' transversal competences (Graczyk-Kucharska *et al.*, 2020). This paper seeks to fill that research gap.

3. Methodology

3.1. Research Methodology

The first stage of the research was a literature analysis in the context of the research gap analysis defined in the first part of the article. Next, the research objective, which is to assess the growth of cross-cutting competencies among students participating in the testing of the new processes using practical training methods at universities in Finland, Poland, Slovakia and Slovenia, was defined. The objects of the study were transversal competences such as entrepreneurship, creativity, communicativeness, and teamwork. Further, the research sample was characterised, data was collected and analysed. The research methods were selected so that different variables could be included in the analysis of the impact on the studied variable, i.e. group work. The rest of the article describes them in detail. Finally, the results were analysed taking into account previous research. The diagram of the research methodology consists of several steps shown in Figure 1.

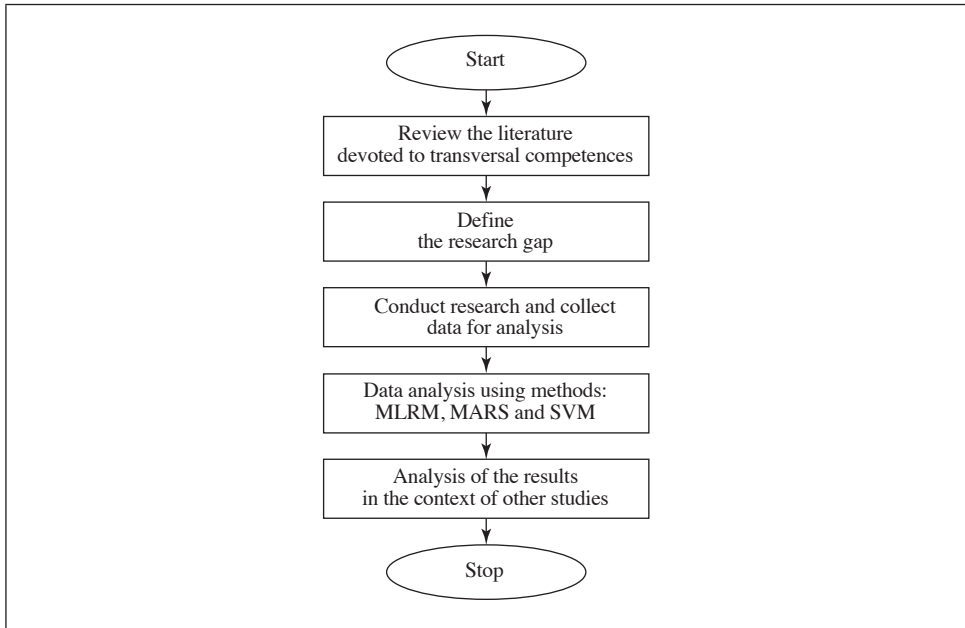


Fig. 1. Graphic Scheme of Research Methodology

Source: the authors.

3.2. The Multiple Linear Regression Method

This section briefly characterises each of the methods that were used to develop the models. Multiple linear regression is a tool that can be used to analyse how different variables are interrelated with one another. Linear regression analysis explains how the value of the response variable is affected by the explanatory variable (Piłatowska, 2006). When there are more than two explanatory variables, we are dealing with multiple regression analysis (Greń, 1984) which is the case of the analysis in this paper. The multiple (also known as multivariate) regression model involves using multiple explanatory variables to predict the value of the response variable (Aczel & Sounderpandian, 2018). We introduce additional explanatory variables into the basic regression model when regression with one explanatory variable does not reach a sufficient value of determination coefficient R^2 . It is meant to reduce residual variability, however, it is only justified when each successive explanatory variable introduced into the model increases the value of the determination coefficient (Iwasiewicz & Paszek, 2004). Multiple linear regression can be used to predict future values of the dependent variable based on the values of the independent variables. It can also be used to determine which independent variables are most important in predicting the dependent variable.

3.3. Multivariate Adaptive Regression Splines

The MARS method aims to combine the method of recursive division and the method of interpolation with splines. The recursive division is a statistical method for the analysis of multiple variable functions. The use of the method results in the development of a decision tree that divides the adopted group according to the selected variables. The spline interpolation method is a numerical method that involves approximating an unknown function with low-degree polynomials (Friedman, 1991).

The MARS method consists of two sub-algorithms known as the forward and the backward stepwise algorithms. The first part involves looking for the main function and then each subsequent step expands the function. The process ends when the model has reached the M_{\max} value which was previously set by the person who applied the method. The backward stepwise option reduces the complexity of the function, i.e. it simplifies it. Principal functions that cause an incremental squared residual error are excluded from the model. When all such errors are eliminated, an optimally approximated model is obtained (Weber *et al.*, 2012).

3.4. Support Vector Machine

Machine learning is referred to as a sub-discipline of artificial intelligence that is responsible for a system's ability to augment knowledge resources, improve behaviour and make its own decisions based on experience. Induction, i.e. the ability to derive generalisations from observations, is responsible for the basis of that skill (Somvanshi *et al.*, 2016).

There are three main types of machine learning, i.e. supervised and unsupervised learning and learning by reinforcement (Pisner & Schnyer, 2020). Sub-disciplines of supervised machine learning include classification, which involves assigning input to output data based on the numerous input-output examples identified during the learning phase (Pisner & Schnyer, 2020). The Support Vector Machine is an abstract machine model which is a classification and algorithm learning model. It uses a simple mathematical model and manipulates it to enable a linear division of the domain (Suthaharan, 2016).

The support vectors are the coordinates of individual observations while the SVM is the hyperplane separating the two classes and maximising the distance between the support vectors of each of them. The SVM decision-making process involves identifying a reproducible boundary, i.e. a hyperplane (Pisner & Schnyer, 2020).

3.5. The Artificial Neural Network Method

A neural network is a system designed to process information. The structure of the system is modelled on the functioning of the human biological nervous system.

One of the features of a neural network is the ability to learn from examples and automatically generalise acquired knowledge. All neural networks consist of three types of neurons, i.e. input, hidden and output neurons which are interconnected by synapses (Abraham, 2005).

There are two stages that make calculating final neuron value possible (Stęgowski, 2004). Firstly, the inserted vectors are multiplied by the synapse's weights and substituted to a given function. Most often, this function is scalar. Secondly, the function output is subject to the input-output activation function (Stęgowski, 2004; Graczyk-Kucharska *et al.*, 2020).

4. Results and Developed Models

4.1. Data Collection

The study was conducted in six European universities in four EU member states, i.e. Poland, Slovakia, Finland and Slovenia. The study ran from February to October 2017, using 10 teaching methods on a sample of 113 students divided into groups of 5 to 15.

The study sample consists of selected students, and the selection should be regarded as purposive-typical. Purposive selection is related to securing full groups for the study, while typicality is related to securing the identifiability of individuals as students. It is therefore required that survey participants be identified, for example, on attendance records. To secure the comparability of the data, it is assumed that groups of full-time students will be included in the survey. The basis for the selection of data was provided by the document "The development of principles for the selection of practical education methods for reference process models" which had been approved by university representatives as part of the ongoing project "Method for accelerating the development of transversal competences in the process of practical education of students". Based on the collected data, several dozen models were developed, some of which are presented in *The Acceleration of Development of Transversal Competences* (Szafrański, Goliński & Simi, 2017).

The project developed an educational methods matrix (Szafrański *et al.*, 2017) that is relevant to the analyses in this paper. After diagnosing the educational methods, each of the 85 methods was evaluated in terms of its impact on the development of transversal skills. This made it possible to calculate the relevance of the educational method for each transversal competence.

During formal education, instructors used 3 educational methods from the available list of 85. After each of them was applied, students completed survey questionnaires regarding changes in their transversal competences. Based on their self-assessment, each of them determined, on a scale of 0–5, to what level their competences increased after a given method had been applied. The difference

between the initial and the final assessment of a skill determines the rate of growth of a given competence.

To develop the model, teamwork skills were chosen as the independent variable. Subsequently, the efficiency of the model was improved by extending the scope of data, using time values as well as ANN, MARS, SVM and multiple regression methods. The input data are shown in Table 3 in the article by Graczyk-Kucharska *et al.* (2020, p. 659). A validation technique was used to compare the methods. Importantly, the amount of training data was 80% while the amount of test data was 20%.

That table incorporates the 26 variables that were included in the analysis. Among other things, it includes the cultural variables described by the Hofstede index, the start and end time of the process, the number of meetings with students, the size of the group, and the year of study.

4.2. Results

The Multiple Linear Regression Model

The study analysed the key variables for the development of the model. The analyses were conducted using STATISTICA software. Figure 2 presents the relevant variables that were included in the further development of the models. These include the average acceleration in Communicativeness (X_9), average acceleration in Creativity (X_8), average acceleration in Entrepreneurship (X_{10}), number of students (X_1) and the rank of the method in the matrix (X_2).

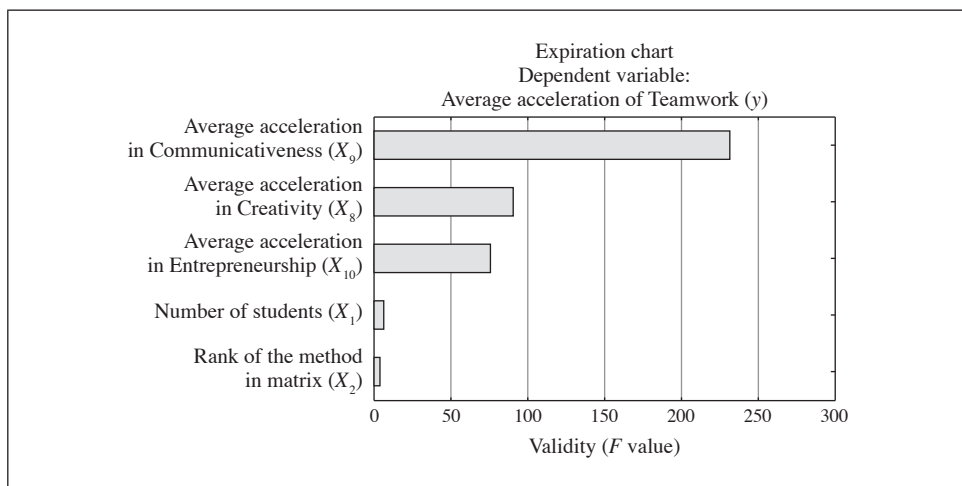


Fig. 2. The Dependent Variable in Modelling Teamwork Competence

Source: the authors.

Table 1 provides the results of the teamwork competence enhancement for the MLRM method. It details the coefficients, standard errors, *t*-values, and *p*-values for each variable, highlighting their significance in the model. Notably, the average acceleration in Communicativeness (X_9) and in Creativity (X_8) reveal significant positive effects on teamwork competence.

Table 1. Results of Teamwork Competence Enhancement for the MLRM Method ($N = 339$)

Specification	b^x	The Standard Error from b^x	b	The Standard Error from b	$t(333)$	p
Average acceleration of Teamwork (y)	–	–	0.2965	0.0809	3.6646	0.0003
Number of students (X_1)	-0.0133	0.0201	-0.0005	0.0007	-0.6593	0.5101
Position of the method in the matrix (X_2)	0.012	0.02	0.0008	0.0014	0.5977	0.5504
Average acceleration in Creativity (X_8)	0.1105	0.0443	0.1134	0.0455	2.4921	0.0132
Average acceleration in Communicativeness (X_9)	0.753	0.0398	0.7403	0.0391	18.9377	0.0000
Average acceleration in Entrepreneurship (X_{10})	0.0978	0.0443	0.0995	0.0450	2.2091	0.0278

Source: the authors.

Furthermore, Figure 3 illustrates the baseline function and regression for the teamwork competence using the Multiple Linear Regression Model. This figure helps visualise the relationship between the dependent variable and the predictors, showcasing the effectiveness of the model in capturing these changes.



Fig. 3. Baseline Function and Regression for the Teamwork Competence Using the MLRM Method

Source: the authors.

Multivariate Adaptive Regression Splines

Generalised cross-validation was used to develop the model (1) with the best predictive fit. The teamwork competence acceleration function was calculated from the following formula:

$$(y) = 3.4514e+000 + 4.9196e-001 * \max(0; (X_9) - 3.6667e+000) - 8.3755e-001 * \max(0; 3.6667e+000 - (X_9)) + 1.5593e-001 * \max(0; (X_8) - 2.3333e+000) + 1.0646e-001 * \max(0; (X_{10}) - 1.5e+000), \quad (1)$$

where:

- y – average acceleration in Teamwork,
- X_1 – number of students,
- X_2 – position of the method in matrix,
- X_8 – average acceleration in Creativity,
- X_9 – average acceleration in Communicativeness,
- X_{10} – average acceleration in Entrepreneurship.

The calculation error for this model was calculated at $R^2 = 0.8748$, adjusted $R^2 = 0.8729$, the standard error of estimation: 0.40. R^2 is about 87%. Therefore, we have a level of explanation as in the case of multiple regression with an accuracy of 1%. The results in the form of a baseline function and a predictive function calculated using MARS are shown in Figure 4.

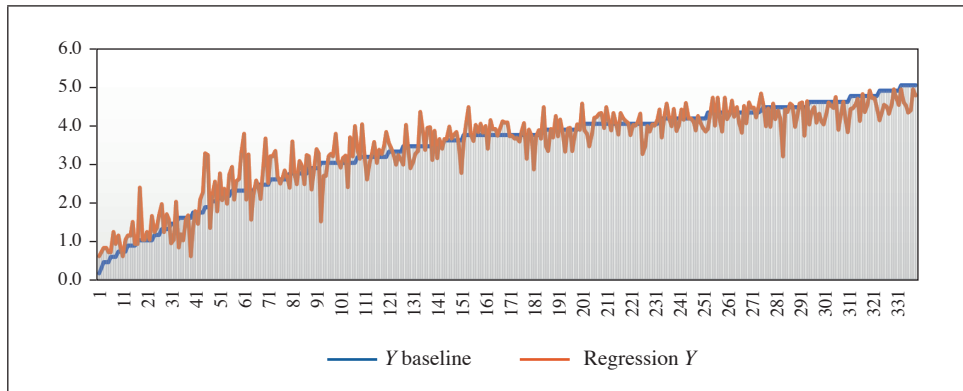


Fig. 4. Baseline and Predictive Function Model for Teamwork Competence Using the MARS Method

Source: the authors.

Support Vector Machine

The SVM model incorporated previously selected relevant variables. Calculations show that for this model the error is $r = 0.938$, adjusted $R^2 = 0.88$ and the

standard error of estimation: 0.4. R^2 is about 88%. In relation to regression or MARS, we gained about 1% of the quality of the model as shown in Figure 5.

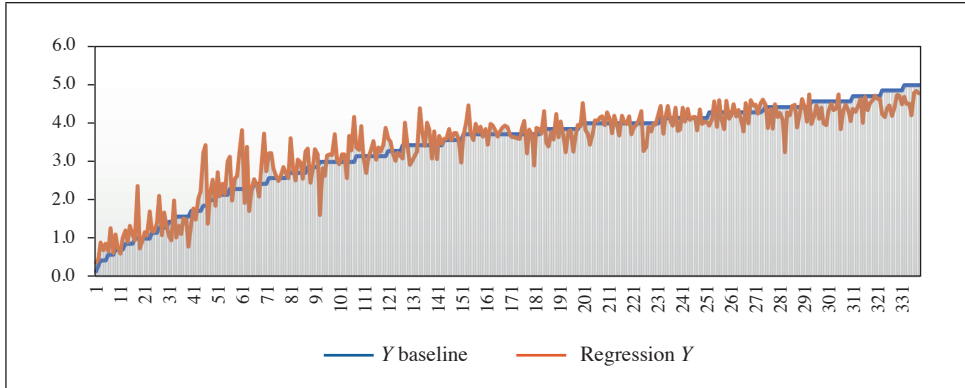


Fig. 5. Baseline and Predictive Function Model for Teamwork Competence Using the SVM Method

Source: the authors.

Artificial Neural Network

To create the model, the authors chose appropriate parameters such as the right kind of algorithm, the right kind of network, the number of hidden layers, the number of neurons in each layer and the kind of transfer function between coats.

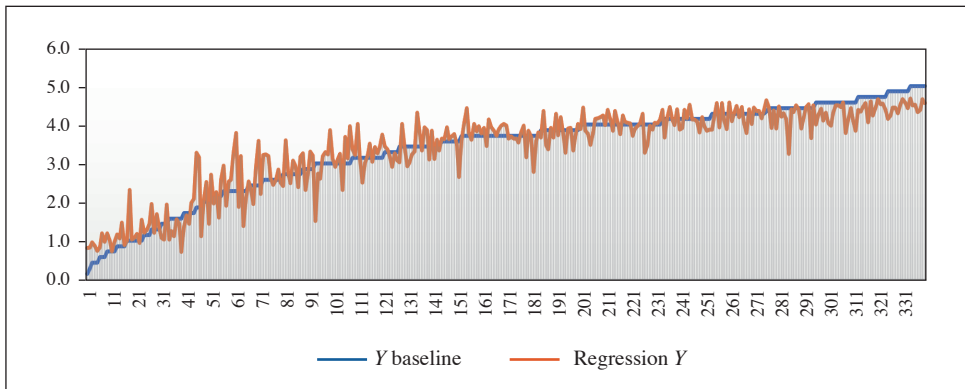


Fig. 6. Baseline and Predictive Function Model for Teamwork Competence Using the ANN MLP Method

Source: the authors.

Feed-forward models and multilayer neural network meta-models were then “trained” in STATISTICA, so that a teamwork prediction could be provided. For ANN Multilayer Perceptrons (MLP) on 88 neurons in the “hidden” layer gives us a modified R^2 of around 92%. In relation to regression or MARS, we gained about 5% of the quality of the model. On 33 neurons in the “hidden” layer – it gives us a modified R^2 of around 91%. These results are presented in Figure 6.

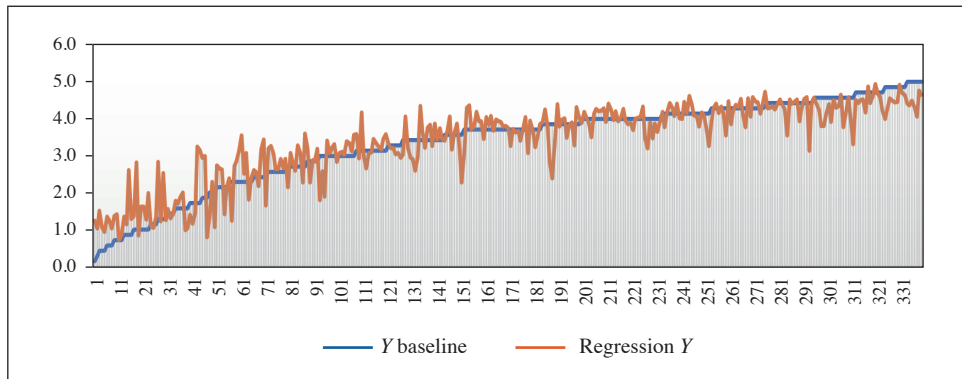


Fig. 7. Baseline and Predictive Function Model for Teamwork Competence Using the ANN RBF Method

Source: the authors.

In addition, a model was developed and results were verified using the ANN Radial Basis Function Networks (RBF) method. The analyses show that about 28 neurons in the \hat{a} layer – hidden nonlinear layer gives us the modified R^2 of around 90%. In relation to regression or MARS, we gained about 3% of the quality of the model. These results are presented in Figure 7.

5. Comparison of the Models

Comparing the results from the models taking into account the same key variables for improving teamwork competence, it must be stated that the presented models make it possible to explain almost 92% of the variability of the phenomenon described by the collected data. The highest adjusted R^2 value was shown for the ANN MLP model (0.92), followed by ANN RBF (0.898), SVM (0.88), MARS (0.873) and MLRM (0.869) – see Table 2.

The obtained results unequivocally point to the dependence of all the studied transversal competences on the competence of teamwork. An earlier study on the same research sample analysed another key transversal competence, i.e. entrepreneurship (Graczyk-Kucharska *et al.*, 2020). That research reveals that the acceleration in obtaining the competence of entrepreneurship is also influenced

Table 2. Performance Measures of Models

Specification	Name of the Method				
	MLRM	MARS	SVM	ANN MLP	ANN RBF
R ²	0.871	0.875	0.880	–	–
Adjusted R ²	0.869	0.873	0.88	0.92	0.898
<i>r</i>	0.933	0.9354	0.938	–	–
The standard error of estimation	0.416	0.4	0.4	0.34	0.32

Source: the authors.

by other competences. The ranking of the educational method in learning is also important. It can therefore be concluded that this research confirms the direction and interdependence of all competences. However, it must be verified further by analysing and developing models for the competences of creativity and communicativeness.

6. Summary and Conclusions

In partnership with six universities, it was possible to develop a method for advancing the procurement of a chosen transversal competence. The analysis used MARS, ANN (MLP and RBF), SVM and MLRM methods. The studied competence was the transversal competence of teamwork. The results of accelerating the acquisition of the competence were analysed taking into account the effect of the reliant variables such as evidence accumulated throughout the trial process and hand-picked transversal competences.

The study makes it possible to select the most relevant variables that enable the acquisition and development of teamwork competence. The analysis and calculations help to compare the effectiveness of the separate methods. They show that the MLRM method is the least accurate but can be best explained by indicating the relevance of individual variables. In this case, the highest dependence is found with the communicativeness competence (X_9). The other methods confirm the relevance of these variables, but their interdependence cannot be easily explained. It is especially true of neural networks. These models, both the ANN MLP and the ANN RBF, explain the largest amount of the studied dataset. However, it should be pointed out that the differences in results between them are not large. The ANN MLP model makes it possible to explain almost 92% of the variability in the phenomenon described by the collected data. Following data collection and analysis and based on the developed models, it can be concluded that entrepreneurship and teamwork strongly influence each other and, in addition, all four transversal competences (entrepreneurship, teamwork, creativity, communicativeness) influence one another.

Transversal competences, including teamwork, are used in many jobs. All competences are interrelated. It can be concluded that if one of them is improved, the other transversal competences are also enhanced at the same time. This has been proven for the competence of entrepreneurship. Further research that confirms this hypothesis in relation to the competences of communicativeness and creativity must be undertaken. Increasingly, employers are looking for employees with developed transversal competences, therefore the results of the study should have implications for the field of education at all levels, including at universities, as well as in companies providing training for employees. The results can be used to inform decisions on the best teaching methods for students, thus helping to accelerate the development of transversal competences, including teamwork.

The study was limited to selected competences and countries. Which means that the possibility of influencing the development of selected competences by other competences was limited. Additionally, the sample was relatively small, so it was not possible to conduct statistical analysis with a small margin of error. Suggestions for further research directions include expansion of the dataset with additional data from other EU countries, expansion of the research sample and continuing research on developing models for the competences of communicativeness and creativity, and expanding the area of analysis to include professional competences. Moreover, future research may focus on transversal competences related to digital competences as relevant in the context of technological change and artificial intelligence.

Authors' Contribution

The authors' individual contribution is as follows: Magdalena Graczyk-Kucharska 30%, Robert Olszewski 30%, Joanna Przybyła 10%, Julia Łuszkiewicz 10%, Klaudia Hojka 10%, Małgorzata Spychała 10%.

Conflict of Interest

The authors declare no conflict of interest.

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Znaczenie przywództwa duchowego w zespołach wirtualnych – ocena rzetelności i trafności narzędzia badawczego

The Importance of Spiritual Leadership in Virtual Teams: Assessing the Reliability and Validity of a Research Tool

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ABSTRACT

Objective: The article examines the relationship between spiritual leadership, a sense of meaning and membership, and virtual team effectiveness. Much of the research points to the applicability of the spiritual leadership model to determine individual and organisational performance. However, there are no studies in this area regarding virtual teams, which have recently become a basic organisational unit at work.

Research Design & Methods: The survey was conducted among 602 members of virtual teams. The confirmatory factor analysis and structural equation modelling were used to determine the validity and reliability of the questionnaire used.

Findings: The research results show, first, that the theoretical model is a good fit and, second, that spiritual leadership has an indirect influence on the effectiveness of virtual teams by building the meaning of work and helping team members feel a sense of belonging.

Implications/Recommendations: The proposed model of spiritual leadership and its variables have been positively verified and the model can be used in a virtual team.

Contribution: In the theoretical context, relationships between variables were identified and the importance of spiritual leadership for virtual teamwork was assessed. In an empirical context, research was conducted that verified the usefulness of the spiritual leadership model, thus proposing a specific tool for assessing spiritual leadership in virtual teams.

Article type: original article.

Keywords: spiritual leadership, virtual team, model, validation, validity, reliability.

JEL Classification: L2, L25, M12.

1. Wprowadzenie

W ostatnim czasie wirtualne zespoły stały się podstawową jednostką organizacyjną. Mimo że znaczna część pracowników wróciła do pracy w trybie stacjonarnym, to część praktycznych rozwiązań pracy zdanej nadal jest stosowana. Szacuje się, że w zespołach wirtualnych lub częściowo wirtualnych pracuje od 40% (Dulebohn i Hoch, 2017) do 85% pracowników (Hacker i in., 2019). Wskazuje to, że praca w zespołach wirtualnych staje się dominującą strukturą we współczesnym środowisku biznesowym, oferując wiele korzyści, takich jak np. możliwość wykorzystania zróżnicowanych zasobów wiedzy, oszczędność czasu czy możliwość współpracy na odległość (Gibson i Gibbs, 2006). Stosunkowo dynamiczne przeniesienie pracy w sferę wirtualną spowodowało zainteresowanie tym tematem i wzrost liczby publikacji w tym zakresie. W ciągu ostatnich dwóch lat ich liczba zwiększyła się o prawie 60% (w latach 2021–2022 średnia liczba publikacji wynosiła 137,5; w latach 2018–2020 była ona równa 85)¹.

Pomimo rosnącej liczby publikacji w zakresie wirtualnych zespołów niewiele z nich dotyczy przywództwa duchowego. Przeprowadzono natomiast liczne badania na temat przywództwa duchowego i jego wpływu na wyniki indywidualne lub organizacyjne (Fry i Egel, 2017; Sharma, 2019; Samul i Wangmo, 2021), jednak w niewielu z nich poruszono kwestię pracy zespołowej (Bayighomog i Arasli, 2019), szczególnie pracy zespołowej wirtualnej. Analiza bibliometryczna publikacji z bazy Scopus – jednej z największych baz danych zawierających pełnotekstowe publikacje naukowe – dostarczyła następujących danych: liczba publikacji dotyczących przywództwa duchowego: 5672, liczba publikacji dotyczących przywództwa duchowego i zespołu: 24, liczba publikacji odnoszących się do przywództwa duchowego

¹ Na podstawie bazy Scopus: wyszukiwanie słowa kluczowego „virtual team” w tytułach publikacji, abstraktach i słowach kluczowych, zawężone do obszaru: biznes, zarządzanie i rachunkowość, kwiecień 2023 r.

i zespołu wirtualnego: 0². Istotne zatem wydaje się określenie, czy przywództwo duchowe może mieć znaczenie dla zespołów wirtualnych.

W ramach niniejszych badań podjęto się realizacji dwóch celów. Pierwszy z nich dotyczył ustalenia związku pomiędzy badanymi zmiennymi, na podstawie których możliwa była ocena znaczenia przywództwa duchowego dla zespołu wirtualnego. Cel drugi dotyczył walidacji modelu przywództwa duchowego w kontekście pracy w zespole wirtualnym. Określenie trafności i rzetelności zaproponowanego kwestionariusza umożliwiło wykorzystanie go do oceny przywództwa duchowego w zespołach wirtualnych. Walidacja konstruktów i jego zmiennych pozwoliła zweryfikować, czy zaproponowany model jest akceptowalny w danym kontekście, w tym przypadku w kontekście pracy wirtualnej. Ocena narzędzi badawczych jest niezbędna dla zapewnienia rygoru prowadzonych badań (Boyd, Gove i Hitt, 2005), który przyczynia się do rozwoju nauk o zarządzaniu i jakości (Czakon, 2019).

Niniejsze badanie przyczyni się do uzupełnienia luk badawczych. Jak wskazała powyższa analiza bibliometryczna, brakuje publikacji dotyczących przywództwa duchowego w kontekście wirtualnej pracy (luka teoretyczna), dlatego istotne wydaje się określenie, czy przywództwo duchowe ma znaczenie w przypadku zespołów wirtualnych. Wskazana luka teoretyczna może wynikać z braku narzędzi do oceny przywództwa duchowego w takich zespołach (luka metodyczna) i braku badań empirycznych weryfikujących przydatność koncepcji przywództwa duchowego w zespołowej pracy wirtualnej (luka empiryczna).

Artykuł ma następującą strukturę: w części drugiej przedstawiono przegląd literatury dotyczącej potencjalnego znaczenia przywództwa duchowego w zespołach wirtualnych. W części trzeciej szczegółowo opisano metodykę przeprowadzonego badania, a w części czwartej zaprezentowano wyniki badań, które następnie zostały omówione. W podsumowaniu zawarto najważniejsze wnioski z badań, implikacje teoretyczne i praktyczne oraz ograniczenia badań.

2. Przywództwo duchowe w zespole wirtualnym

Zespoły wirtualne są stosowane m.in. dlatego, aby ograniczyć bariery związane z rozproszeniem, czasem i przestrzenią. Elastyczność wirtualnej infrastruktury potrzebnej do pracy zdalnej zmniejsza koszty i oszczędza czas, co z kolei pomaga zwiększać produktywność (Brzozowski, 2010; Martinic, Fertalj i Kalpic, 2012). Niektórzy autorzy utożsamiają wirtualność z nietrwałością i niestabilnością więzi w ramach organizacji (Mesjasz, 2008). Praca w zespole wirtualnym związana jest z trudnościami w porozumiewaniu się i nawiązywaniu relacji pomiędzy członkami

² Poszukiwane słowa kluczowe: 1) „przywództwo duchowe”, 2) „przywództwo duchowe” i „zespół”, 3) „przywództwo duchowe” i „zespół wirtualny” w tytule artykułu, abstrakcie i słowach kluczowych, zawężone do obszaru: biznes, zarządzanie i rachunkowość, kwiecień 2023 r.

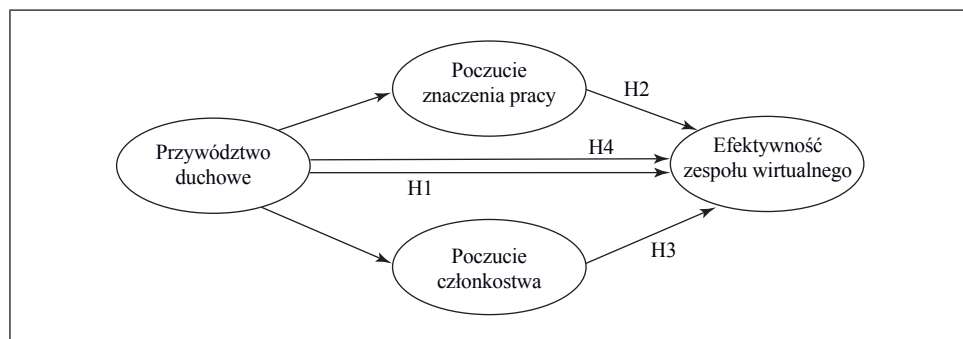
zespołu, którzy są rozproszeni w przestrzeni fizycznej, co może prowadzić do mniejszej efektywności, braku zaufania, a także nieporozumień i konfliktów wewnątrzgrupowych (Ferrazzi, 2014). Komunikacja w zespole wirtualnym różni się od komunikacji w zespole tradycyjnym – interakcje twarzą w twarz zostają zastąpione przez komunikację za pośrednictwem technologii (Majchrzak i in., 2005; Chutnik i Grzesik, 2009; Bell, McAlpine i Hill, 2019). Wiele badań potwierdza negatywny wpływ pracy wirtualnej na relacje pracowników z przełożonymi (Van Veldhoven i in., 2020) oraz na motywację i zaangażowanie, które bez „nieformalnej kawy czy rozmów na korytarzu” (Agrawal i in., 2020) są trudniejsze do kształtowania.

Zarządzanie zespołem wirtualnym wiąże się z wieloma wyzwaniami stojącymi przed osobami zarządzającymi – powstają pytania, jak dbać o siebie, zespół i organizację oraz jak przewodzić w stresujących i niepewnych warunkach. Wyzwaniom tym można sprostać, wykorzystując przywództwo oparte na wartościach duchowych – związanych z wewnętrzną świadomością wyrażaną poczuciem harmonii oraz życiem według wewnętrznej prawdy w celu tworzenia pozytywnych postaw i relacji. W kontekście organizacyjnym przywództwo duchowe jest tym, czego skuteczny lider używa do kształtowania zachowania jednostki, rozpoznawania sensu i znaczenia pracy, tworzenia wizji, dostrzegania i doceniania wysiłku współpracowników, a także umożliwiania wyrażania i identyfikowania wartości, które stanowią podstawę działania organizacji.

Badania przeprowadzone dotychczas w wirtualnych zespołach wskazują na istotną rolę lidera. Jak pisze Liao (2017), zachowania lidera zorientowane na zadania i relacje są ważne w pracy wirtualnej. Bartsch i in. (2020) potwierdzili tę zależność, dodając, że spójność zespołu i autonomia są czynnikami wpływającymi na pozytywne relacje między liderem a wirtualnym zespołem. Chutnik i Grzesik (2009) wśród kompetencji lidera zespołu wirtualnego wymieniają docenienie wartości różnorodności zespołu, budowanie zaufania i utrzymywanie relacji oraz dbanie o zespół. Przeprowadzone w tym zakresie badania wskazują, że przywództwo transformacyjne odgrywa kluczową rolę w skutecznym kierowaniu zespołem wirtualnym (Purvanova i Bono, 2009; Rybnikova i Lang, 2021), a podejścia przywódcze, w których obowiązki przywódcze są podzielone między więcej niż jedną osobę, wpływają na wyniki zespołu wirtualnego (Hoegl i Muethel, 2016). Zatem istotne wydaje się określenie, czy również przywództwo duchowe może wpływać na wyniki zespołu wirtualnego. Wyniki badań dotyczących przywództwa duchowego wskazują na jego korzystny wpływ na takie elementy, jak zaangażowanie w organizację, zachowania obywatelskie czy dobre samopoczucie (np. Fry i Slocum, 2008; Fry i Cohen, 2009; Chen i Yang, 2012; Chen, Chen i Li, 2013), jednak badania w zakresie wpływu przywództwa duchowego na zespoły są ograniczone. W pracy (Yang, Huang i Wu, 2019) wskazano, że przywództwo duchowe jest pozytywnie powiązane z efektywnością zespołu, dlatego uważa się, że może mieć znaczenie również w przypadku zespołu wirtualnego. Według Liao (2017) przeprowadzono niewiele badań pozwalających

jących zrozumieć proces i zachowanie liderów, którzy muszą przewodzić zespołom wirtualnym. To skłania do refleksji, czy koncepcja przywództwa duchowego definiowana jako wartości, postawy i zachowania lidera, które są niezbędne do budowania wewnętrznej motywacji zarówno własnej, jak i innych oraz potrzebne do zaspokojenia poczucia dobrostanu duchowego, czyli poczucia znaczenia pracy i poczucia członkostwa (Fry, 2003, s. 694), może być istotna w przypadku zespołów wirtualnych.

Przywódcy duchowi dbają o zespół, wyrażając troskę, okazując szacunek poszczególnym jego członkom, uważnie słuchając i uznając ich indywidualny wkład w wyniki zespołu (Reave, 2005). Takie praktyki liderów duchowych tworzą sprzyjającą atmosferę, która zwiększa wewnętrzną motywację i zaangażowanie członków zespołu do pracy (Chen, Chen i Li, 2013). Jednym z elementów, na które wpływa przywództwo duchowe, jest poczucie znaczenia pracy, uznawane przez ludzi za jej najważniejszą cechę (Cascio, 2003; Michaelson i in., 2014). Kiedy pracownicy czują, że to, co robią w pracy, ma sens, uważają swoją pracę za znaczącą, wartościową i interesującą (Hackman i Oldham, 1976). Z drugiej strony, gdy pracownicy uznają swoją pracę za bezsensowną, będą myśleć o niej jako o trywialnej, bezwartościowej i nudnej. Ważne jest również poczucie tożsamości zespołowej. Jeżeli członek zespołu wirtualnego utożsamia się z zespołem, postrzega pozostałe osoby jako członków grupy. Jeśli jednak bycie częścią zespołu wirtualnego wiąże się z niewielkim poczuciem tożsamości, członek zespołu może postrzegać pozostałe osoby jako członków obcej grupy (Ferguson, 2004). Pomimo że literatura przedmiotu poświęcona poczuciu znaczenia pracy i poczuciu członkostwa staje się coraz bogatsza, niewiele badań dotyczy istoty tych czynników w kontekście zespołów (Yang, Huang i Wu, 2019). Jeszcze mniej takich badań dotyczy zespołu wirtualnego. Przywództwo duchowe wpływa na poczucie znaczenia pracy i poczucie członkostwa (Fry, 2003; Samul, 2022), co może przyczynić się do większej efektywności zespołu wirtualnego.



Rys. 1. Teoretyczny model przywództwa duchowego w zespole wirtualnym

Źródło: opracowanie własne.

W związku z powyższym zaproponowano następujące hipotezy:

H1: Przywództwo duchowe ma pozytywny wpływ na efektywność zespołu wirtualnego.

H2: Poczucie znaczenia pracy członków zespołu wirtualnego ma pozytywny wpływ na jego efektywność.

H3: Poczucie członkostwa w zespole wirtualnym pozytywnie wpływa na jego efektywność.

H4: Przywództwo duchowe ma pozytywny wpływ na efektywność zespołu wirtualnego za pośrednictwem poczucia znaczenia pracy i poczucia członkostwa.

Hipotezy te zostały przedstawione na rys. 1.

3. Metodyka badań

3.1. Próba badawcza

Badania przeprowadzono wśród 200 zespołów wirtualnych i 602 respondentów (badaniem objęto co najmniej po 3 członków z każdego zespołu). Do wyboru zespołów zastosowano następujące kryteria: musiały to być zespoły co najmniej 3-osobowe, które pracują wirtualnie co najmniej 50% swojego czasu pracy. Drugie kryterium związane było z jednej strony z próbą wyeliminowania respondentów, którzy sporadycznie pracują zdalnie, a z drugiej – z ułatwieniem dostępu do zespołów wirtualnych. Zespół wirtualny określony został zgodnie z definicją, którą zaproponowali Powell, Piccoli i Ives (2004, s. 7), jako „grupa pracowników rozproszonych geograficznie, organizacyjnie i/lub czasowo, pracująca razem za pomocą technologii informatycznych w celu wykonania jednego zadania organizacyjnego lub więcej”. W badaniach zastosowano nielosową metodę doboru próby, polegającą na wyborze uczestników ze względu na ich dogodną dostępność i bliskość (tzw. dobór wygodny). W tabeli 1 przedstawiono charakterystykę badanych zespołów i respondentów.

Tabela 1. Charakterystyka respondentów i zespołów wirtualnych

Cechy zespołu	Liczba	Udział (%)
Liczba zespołów	200	100
Wielkość zespołu:		
3–5 członków	66	33
6–10 członków	65	33
11–15 członków	30	15
powyżej 16 członków	39	20

cd. tabeli 1

Cechy zespołu	Liczba	Udział (%)
Branża przedsiębiorstwa:		
produkcja	44	22
handel	31	16
usługi	125	63
Wielkość przedsiębiorstwa:		
mikro (poniżej 10 osób)	19	10
małe (10–49 osób)	67	34
średnie (50–249 osób)	56	28
duże (powyżej 250 osób)	58	29
Liczba respondentów	602	100
Płeć:		
kobieta	345	57
mężczyzna	257	43
Wiek:		
poniżej 25 lat	75	12
25–35 lat	284	47
36–50 lat	204	34
powyżej 50 lat	39	7
Wykształcenie:		
podstawowe	0	0
gimnazjalne	7	1
zawodowe	44	7
średnie	221	37
wyższe	330	55
Staż pracy w aktualnym zespole:		
poniżej 1 roku	108	18
1–5 lat	294	48
6–10 lat	132	22
11–15 lat	43	7
16–20 lat	15	2
powyżej 20 lat	10	1

Źródło: badania własne.

3.2. Skale pomiarowe

W badaniach wykorzystano trzy skale pomiarowe. Do pomiaru przywództwa duchowego wykorzystano narzędzie badawcze, które zaproponowali Fry, Vitucci

i Cedillo (2005), służące do oceny modelu przywództwa duchowego. Autorzy narzędzia wyodrębnili trzy zmienne przywództwa duchowego: 1) wizję, definiowaną jako wyznaczanie kierunków rozwoju organizacji, 2) nadzieję, określoną jako podejmowanie wysiłku w celu konsekwentnego dążenia do osiągnięcia wyznaczonych celów, 3) altruistyczną postawę lidera wobec członków zespołu, charakteryzującą się uniwersalnymi wartościami, takimi jak: zaufanie, lojalność, uprzejmość, współczucie czy szacunek.

Do zbadania poczucia znaczenia pracy i poczucia członkostwa również zastosowano skale, które zaproponowali Fry, Vitucci i Cedillo (2005). Poczucie znaczenia pracy zdefiniowane zostało jako poczucie sensu i znaczenia tego, co robimy w pracy, natomiast poczucie członkostwa jako bycie rozumianym i docenianym zarówno przez przełożonego, jak i pozostałych członków zespołu. Kwestionariusz zaproponowany przez wskazanych autorów został odpowiednio dostosowany do zespołu wirtualnego, np. „Czuję się doceniony jako pracownik” (oryginalne pytanie) zmieniono na „Czuję się doceniony jako członek zespołu” (zmodyfikowane pytanie).

Do pomiaru efektywności pracy, rozumianej jako właściwe wykorzystanie zasobów do realizacji zaplanowanych celów w zespole wirtualnym, zastosowano skalę, której autorami są Lin, Standing i Liu (2008), z trzema stwierdzeniami (np. „Nasz zespół realizuje postawione cele”).

Kwestionariusz ankietowy ze zmiennymi został zaprezentowany w załączniku (tabela Z1). W badaniach zastosowano pięciostopniową skalę, gdzie 1 oznaczało „zdecydowanie nie”, a 5 – „zdecydowanie tak”. Skonstruowane w ten sposób narzędzie zostało poddane walidacji, czyli ocenie stopnia trafności i rzetelności.

3.3. Analiza danych

W badaniach zastosowano confirmacyjną analizę czynnikową i modelowanie równań strukturalnych. Modelowanie za pomocą równań strukturalnych pozwala na zweryfikowanie hipotez o zależnościach pomiędzy poszczególnymi zmiennymi, dotyczących zarówno ich występowania, jak i siły oraz kierunku wpływu (Korol, 2005; Sroka, 2009). Do modelowania zastosowano program IBM SPSS Statistics. Walidacja modelu polegała na określeniu stopnia trafności i rzetelności. Trafność oceniono w aspektach trafności zbieżnej z wykorzystaniem przeciętnej wariancji wyodrębnionej – AVE (Rakowska i Mącik, 2016) oraz dyskryminacyjnej, w której szacuje się korelacje między zmiennymi. Rzetelność pomiaru określona została za pomocą współczynników: alfa Cronbacha i rzetelności łącznej – CR (Rakowska i Mącik, 2016).

4. Wyniki badań

Analizę danych rozpoczęto od przeprowadzenia confirmacyjnej analizy czynnikowej (CFA) w celu sprawdzenia, czy konstrukt zmiennych jest zgodny z danymi

empirycznymi. CFA służy do testowania hipotez dotyczących relacji między czynnikami wspólnymi, które tłumaczą korelacje pomiędzy zmiennymi obserwowalnymi (Kowalska-Musiał, 2009). Oszacowano wartości ładunków czynnikowych (tabela 2), które dla liczebności próby powyżej 200 powinny wynosić więcej niż 0,4 (Hair i in., 2006). Oszacowane wartości ładunków czynnikowych badanych zmiennych są znacznie powyżej 0,6, a ich istotność statystyczna jest na poziomie mniejszym niż 0,05 ($p < 0,05$).

Tabela 2. Wartości ładunków czynnikowych zmiennych

Zmienna		1	2	3	4	5	6
Wizja	W1	0,779					
	W2	0,840					
	W3	0,873					
	W4	0,767					
Nadzieja	N1		0,814				
	N2		0,756				
	N3		0,772				
	N4		0,844				
Altruizm	A1			0,802			
	A2			0,751			
	A3			0,695			
	A4			0,823			
	A5			0,767			
Poczucie znaczenia pracy	Z1				0,770		
	Z2				0,789		
	Z3				0,830		
	Z4				0,753		
Poczucie członkostwa	C1					0,862	
	C2					0,830	
	C3					0,846	
	C4					0,833	
Efektywność zespołu wirtualnego	WW1						0,846
	WW2						0,820
	WW3						0,829
Miara KMO – adekwatność doboru próby							0,965

Uwaga: $p < 0,05$.

Źródło: badania własne.

Obliczono również współczynnik Kaisera-Meyera-Olkina (KMO), który wyniósł 0,965, co potwierdza zasadność przeprowadzenia analizy czynnikowej. Im wyższa jest jego wartość (bliżej 1), tym bardziej zasadne jest zastosowanie analizy czynnikowej do oceny związków między obserwowalnymi zmiennymi (Kowalska-Musiał i Ziółkowska, 2013).

Następnie oszacowano podstawowe miary statystyczne (średnią i odchylenie standardowe). Wszystkie zmienne zostały ocenione stosunkowo wysoko – pięć na sześć zmiennych uzyskało średnią powyżej 4,0 (tabela 3). Najwyżej ocenioną zmienną jest efektywność zespołu wirtualnego (średnia 4,20; odchylenie standardowe 0,83), następnie poczucie członkostwa (średnia 4,16; odchylenie standardowe 0,82) oraz altruizm (średnia 4,11; odchylenie standardowe 0,83). Najniżej ocenione zostało z kolei poczucie znaczenia pracy (średnia 3,96; odchylenie standardowe 0,95).

W celu określenia trafności dyskryminacyjnej obliczono współczynniki korelacji rang Spearmana. Wartości współczynników powinny być większe niż 0,4, ale mniejsze niż 0,9, co wskazuje na wysoką, ale prawidłową korelację między zmiennymi obserwowalnymi (Akoglu, 2018). Analiza poszczególnych zmiennych wskazuje na pozytywne (od 0,588 do 0,831) i istotne statystycznie ($p > 0,01$) korelacje pomiędzy badanymi zmiennymi. Otrzymane wyniki potwierdzają pozytywną walidację zmiennych, co oznacza, że zmienne dobrze odzwierciedlają model pomiarowy.

Tabela 3. Podstawowa statystyka i korelacje między zmiennymi

Zmienna	Średnia	Odchylenie standardowe	1	2	3	4	5	6
1. Wizja	4,02	0,92	1	0,816	0,696	0,742	0,682	0,588
2. Nadzieja	4,01	0,89	–	1	0,726	0,831	0,700	0,613
3. Altruizm	4,11	0,83	–	–	1	0,659	0,782	0,660
4. Poczucie znaczenia pracy	3,96	0,95	–	–	–	1	0,621	0,595
5. Poczucie członkostwa	4,16	0,82	–	–	–	–	1	0,645
6. Efektywność zespołu wirtualnego	4,20	0,83	–	–	–	–	–	1

Uwaga: $p > 0,01$.

Źródło: opracowanie własne.

Następnie oszacowano parametry trafności i rzetelności modelu pomiarowego (tabela 4). Trafność została oceniona w aspekcie trafności zbieżnej za pomocą AVE (proporcji przeciętnej wariancji wyodrębnionej). Rzetelność pomiaru określono natomiast za pomocą współczynników alfa Cronbacha oraz rzetelności łącznej – CR. Statystyka rzetelności alfa Cronbacha dla każdej zmiennej osiągnęła wartości

powyżej 0,7, co oznacza spójność wewnętrzną, a zatem zmienne obserwowalne mierzą to samo zjawisko. Wskaźniki rzetelności CR także osiągnęły wartości powyżej 0,7 (Hair, Ringle i Sarstedt, 2013) dla wszystkich zmiennych. Natomiast współczynniki AVE dla pięciu z sześciu zmiennych osiągnęły wartości wyższe niż wymagane, tj. 0,5 (Na-Nan, 2020). Dla zmiennej „altruizm” wartości te wyniosły nieco poniżej 0,5. Zmienna ta związana jest przede wszystkim z oceną menedżerów w organizacji. Całościowa ocena niniejszych parametrów wskazuje na trafność teoretyczną i rzetelność dopasowania zastosowanych stwierdzeń do badanych zmiennych modelu przywództwa duchowego.

Tabela 4. Ocena trafności i rzetelności modelu pomiarowego

Zmienna	Rzetelność		Trafność
	CR	alfa Cronbacha	AVE
1. Wizja	0,818	0,831	0,530
2. Nadzieja	0,807	0,806	0,512
3. Altruizm	0,786	0,825	0,425
4. Poczucie znaczenia pracy	0,860	0,787	0,605
5. Poczucie członkostwa	0,802	0,863	0,506
6. Efektywność zespołu wirtualnego	0,777	0,776	0,537

Źródło: badania własne.

W kolejnym etapie oszacowano miary jakości dopasowania modelu teoretycznego do danych (tabela 5). Przyjmuje się, że każdy model stanowi uproszczony obraz rzeczywistości; dopasowanie polega więc na ocenie, który z hipotetycznych modeli najlepiej odzwierciedla rzeczywistość. Zaproponowano dwa modele: model 1 jest modelem wyjściowym uwzględniającym wszystkie zmienne, natomiast model 2 został zmodyfikowany w celu lepszego dopasowania do danych. W modelu 2 usunięto dwa sformułowania odnoszące się do zmiennej „altruizm”, tj. A2 – „Menedżerowie w mojej organizacji są uczciwi i skromni” i A3 – „Moja organizacja jest godna zaufania i lojalna wobec swoich pracowników”, które najmniej pasowały do modelu. Można zauważyć, że te dwie zmienne wskazywały najniższe współczynniki w przeprowadzonej wcześniej analizie czynnikowej oraz niższą trafność zbieżną AVE, co również świadczy o słabszym dopasowaniu.

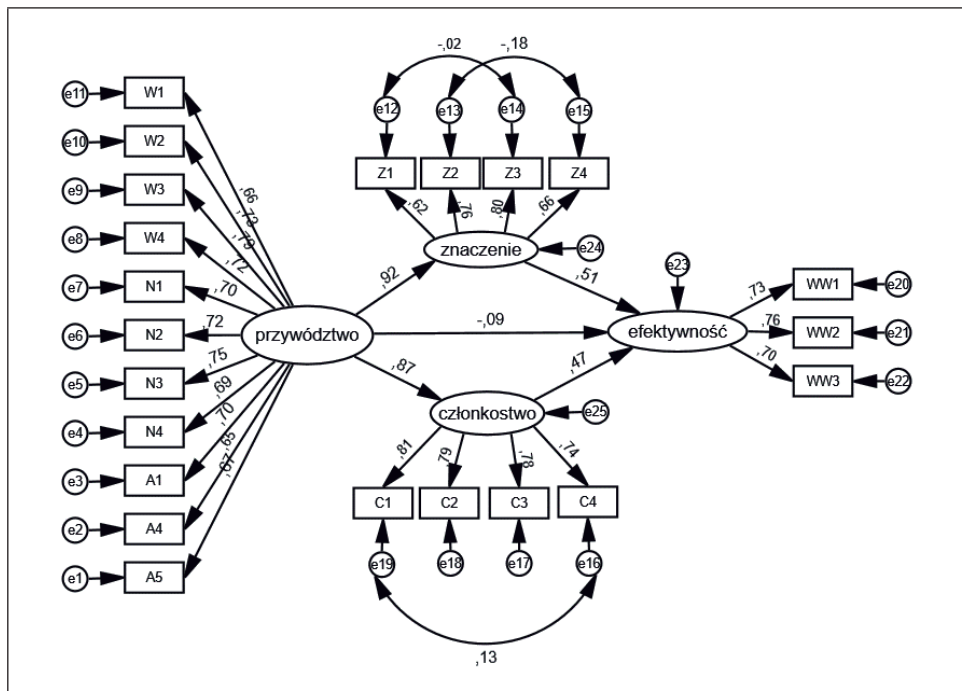
Najczęściej spotykanym wskaźnikiem dobroci dopasowania hipotetycznego modelu do danych jest wartość statystyki chi-kwadrat (Sztenberg-Lewandowska, 2008). Stosunek chi-kwadrat do stopnia swobody wynosi 3,1 dla modelu 1 i 2,9 dla modelu 2, co oznacza, że model 2 jest lepiej dopasowany, gdyż parametr ten powinien mieścić się w przedziale od 1 do 3. Wskaźnik RMSEA dla obu badanych modeli wynosi 0,069, co świadczy o satysfakcjonującym dopasowaniu modelu

(Hair i in., 2007). W grupie miar jakości dopasowania obliczono: CFI (indeks dopasowania porównawczego Bentlera), NFI (normatywny wskaźnik dopasowania), IFI (indeks przyrostu dopasowania) oraz TLI (indeks Tuckera-Lewisa). Parametry te dla modelu dobrze dopasowanego powinny być większe od 0,90. Można zauważyć, że model 2 lepiej spełnia wymagania dotyczące parametrów dopasowania. Wszystkie oszacowane wskaźniki dla modelu 2 są wyższe niż 0,90, co pozwala uznać ten model za satysfakcjonująco dopasowany. Dobre dopasowanie modelu oznacza, że jest on stosunkowo dobrze dopasowany do danych. Model 2 został przyjęty do dalszej analizy.

Tabela 5. Ocena dopasowania modeli do danych

Model	χ^2	df	χ^2/df	CFI	NFI	IFI	TLI	RMSEA
1	765,7	247	3,1	0,914	0,888	0,915	0,896	0,069
2	582,9	201	2,9	0,925	0,902	0,926	0,906	0,069

Źródło: badania własne.



Rys. 2. Model strukturalny przywództwa duchowego w zespole wirtualnym

Źródło: opracowanie własne.

Na rys. 2 przedstawiono model strukturalny przywództwa duchowego w zespole wirtualnym, który podlegał weryfikacji. Model prezentuje wewnętrzną strukturę ścieżkową, ukazującą przyczynowo-skutkowe relacje między zmiennymi ukrytymi a ich obserwowalnymi wskaźnikami. Wyniki estymacji parametrów modeli wskazują, że na poziomie istotności 0,01 wszystkie parametry są istotne statystycznie. Pozytywne relacje występują pomiędzy przywództwem duchowym a poczuciem znaczenia pracy i poczuciem członkostwa (odpowiednio $\beta = 0,92$ i $\beta = 0,87$, $p < 0,01$). Poczucie znaczenia pracy i poczucie członkostwa w zespole również silnie korelują z efektywnością zespołu wirtualnego (odpowiednio $\beta = 0,51$ i $\beta = 0,47$, $p < 0,01$), co potwierdza hipotezy H2 i H3. Bezpośredni wpływ przywództwa duchowego na efektywność zespołu wirtualnego jest ujemny ($\beta = -0,09$, $p < 0,01$), co powoduje odrzucenie hipotezy H1. Przywództwo duchowe wpływa natomiast pozytywnie i znacząco na efektywność pracy zespołu wirtualnego, ale jest to wpływ pośredni poprzez poczucie znaczenia pracy ($\beta = 0,51$, $p < 0,01$) i poczucie członkostwa ($\beta = 0,41$, $p < 0,01$). Całkowity wpływ przywództwa duchowego na efektywność zespołu wirtualnego, w którym poczucie znaczenia pracy i poczucie członkostwa odgrywają rolę pośredniczącą, wynosi $\beta = 0,881$, co pozwala pozytywnie zweryfikować hipotezę H4.

5. Podsumowanie

W ramach niniejszych badań dokonano walidacji modelu przywództwa duchowego w kontekście zespołu wirtualnego i określono relacje występujące między poszczególnymi zmiennymi modelu. Przeprowadzone badania przyczyniły się do zmniejszenia wskazanych wcześniej luk badawczych. W kontekście teoretycznym podjęto próbę oceny znaczenia przywództwa duchowego dla wirtualnej pracy zespołowej. Analiza literatury z tego zakresu wskazała na potencjalne znaczenie przywództwa duchowego, jeśli chodzi o pracę wirtualną. W kontekście empirycznym przeprowadzono badania, na podstawie których zweryfikowano przydatność modelu przywództwa duchowego w pracy zespołu wirtualnego, a tym samym zaproponowano konkretne narzędzie do oceny przywództwa duchowego w zespołach wirtualnych.

Model przywództwa duchowego i jego zmienne zostały pozytywnie zweryfikowane, co wskazuje, że model może być stosowany do badań w zespole wirtualnym. Zauważalny jest jednak negatywny bezpośredni wpływ przywództwa duchowego na efektywność zespołu wirtualnego. Warto byłoby zatem skonfrontować uzyskane wyniki z wynikami innych badań i potwierdzić lub zanegować brak wpływu tego stylu przywództwa na efektywność zespołu wirtualnego, jak również zweryfikować sam model przywództwa duchowego, w którym jedna

zmienna – altruizm – została nieco zmodyfikowana i wykazuje jednocześnie najsłabsze dopasowanie do modelu. Należy także rozważyć przyczyny braku tego wpływu w kontekście pracy wirtualnej. Liczne badania wskazują, że istnieje pozytywny wpływ przywództwa duchowego na wyniki organizacyjne i indywidualne pracowników, a także wyniki zespołowe. Być może specyfika pracy wirtualnej wiąże się z małymi możliwościami wpływu wartości, postaw i zachowań lidera, które opierają się na wartościach duchowych, na zespół pracujący zdalnie. Jednak pośredni wpływ przywództwa duchowego poprzez takie działania, jak wzmacnianie poczucia znaczenia pracy i poczucia bycia członkiem zespołu ma już duże znaczenie, jeśli chodzi o wyniki pracy zespołowej w kontekście pracy wirtualnej. Wydaje się zatem, że warto skoncentrować się na poszukiwaniu innych czynników, które mogą mieć wpływ na znaczenie przywództwa duchowego w zespole pracującym zdalnie.

Niniejsze badania mają implikacje teoretyczne i praktyczne. Jeśli chodzi o te pierwsze, uzupełniono dotychczas przeprowadzone badania w zakresie przywództwa duchowego w wirtualnej pracy zespołowej. Stanowi to istotny wkład w badania organizacyjne. W kontekście implikacji praktycznych wskazano, że lider zespołu wirtualnego powinien dbać o potrzeby swojego zespołu, związane z poczuciem znaczenia wykonywanej pracy i poczuciem przynależności do tego zespołu. Są to zmienne, które determinują sprawność i skuteczność zespołu wirtualnego w osiąganiu wyznaczonych celów.

Przeprowadzone badania mają kilka ograniczeń. Przede wszystkim koncentrują się tylko na dwóch czynnikach pośredniczących, które przyczyniają się do pozytywnego wpływu przywództwa duchowego na efektywność pracy wirtualnego zespołu. Warto byłoby zatem przeanalizować inne czynniki, które potencjalnie również mogłyby wpływać na te relacje. Dane zebrane do analizy empirycznej modelu dotyczą tylko polskich zespołów wirtualnych, dlatego mogą ograniczać możliwość uogólnienia wyników badania. Należałoby zatem powtórzyć te badania w innych kontekstach kulturowych.

Finansowanie badań

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Konflikt interesów

Autorka deklaruje brak konfliktu interesów.

Załącznik

Tabela Z1. Kwestionariusz „Przywództwo duchowe w wirtualnym zespole”

Lp.	Symbol	Stwierdzenia
Wizja		
1	W1	Znam wizję mojej organizacji i jestem zaangażowana/zaangażowany w jej realizację
2	W2	Moja organizacja ma wizję, która wydobywa ze mnie to, co najlepsze
3	W3	Wizja mojej organizacji inspiruje mnie do podejmowania wysiłku na rzecz jej realizacji
4	W4	Wizja mojej organizacji jest klarowna i zachęcająca do działania
Nadzieja		
5	N1	Ufam mojej organizacji i jestem gotowa/gotowy „zrobić wszystko”, jeżeli jest to potrzebne do spełnienia jej misji
6	N2	Okazuję swoją ufność do organizacji i jej misji, wykonując wszystko to, co mogę i co pomaga nam osiągnąć sukces
7	N3	Dokładam wszelkich starań, aby pomóc mojej organizacji odnieść sukces, ponieważ wierzę w to, co ona reprezentuje
8	N4	Wyznaczam sobie ambitne cele w pracy, ponieważ wierzę w moją organizację i chcę, abyśmy odnieśli sukces
Altruizm		
9	A1	Menedżerowie w mojej organizacji robią to, co mówią, i dają odczuć pracownikom, że to, co robią, jest dobre
10	A2	Menedżerowie w mojej organizacji są uczciwi i skromni
11	A3	Moja organizacja jest godna zaufania i lojalna wobec swoich pracowników
12	A4	Menedżerowie w mojej organizacji mają odwagę stanąć w obronie swoich pracowników
13	A5	W mojej organizacji pracowników traktuje się w sposób przyjazny, a kiedy dzieje się coś niepokojącego, menedżerowie starają się temu zaradzić
Poczucie znaczenia pracy		
14	Z1	Praca, którą wykonuję, może zmieniać życie ludzi
15	Z2	Praca, którą wykonuję, ma znaczenie
16	Z3	Praca, którą wykonuję, jest dla mnie bardzo ważna
17	Z4	Moja praca i wykonywane zadania są dla mnie istotne ze względów osobistych
Poczucie członkostwa		
18	C1	Czuję się doceniony jako członek zespołu i moja praca również jest doceniana
19	C2	Czuję, że w mojej organizacji okazuje się szacunek każdemu członkowi zespołu i jego pracy
20	C3	Czuję, że jestem ceniona w pracy również jako człowiek, a nie tylko jako członek zespołu
21	C4	Czuję się szanowana/szanowany przez moich przełożonych

cd. tabeli Z1

Lp.	Symbol	Stwierdzenia
Efektywność zespołu wirtualnego		
22	WW1	Nasz zespół działa sprawnie
23	WW2	Nasz zespół realizuje postawione cele
24	WW3	Nasz zespół wykonuje zadania zgodnie z harmonogramem

Źródło: opracowanie własne.

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Kontrowersje wokół jakości informacji o całkowitym dochodzie prezentowanych przez jednostki gospodarcze

Controversies around the Quality of Comprehensive Income Information Presented by Business Entities

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ABSTRACT

Objective: The article assesses the current way of presenting achievements (measured by comprehensive income) by selected joint-stock companies in the statement of financial position. This is done in the light of the concept of comprehensive income and the comparability and understandability of financial information. The article also presents the authors' solution for presenting comprehensive income.

Research Design & Methods: The research method used in the theoretical part is a critical analysis of IFRS regulations (in particular IAS 1) and the literature thereof. The empirical part uses financial statements prepared for 2022 by selected companies listed on the Warsaw Stock Exchange. On the basis of those, a critical assessment of the information presented on comprehensive income and its components is presented.

Findings: The research shows the lack of uniform solutions in the presentation of comprehensive income, especially in the context of the statement of financial position. The effect of such a state of affairs is the low quality of reporting information, and thus the limited readability of reports and the usability of information for stakeholders.

Implications/Recommendations: Presenting the value of the profit or loss and other comprehensive income directly in the structure of equity should be made obligatory. This would increase the readability of information on comprehensive income, and reduce the ambiguity stakeholders face in interpreting it. It would also ensure a close link between the elements of the financial statements, the layout of which is partly based on the concept of comprehensive income.

Contribution: The authors' solution for presenting comprehensive income in the statement of financial position is the main contribution.

Article type: original article.

Keywords: comprehensive income, profit or loss, other comprehensive income, retained earnings.

JEL Classification: M41, M48.

1. Wprowadzenie

Dochód całkowity został wprowadzony do międzynarodowej sprawozdawczości finansowej w 2009 r. jako kategoria odzwierciedlająca nową koncepcję pomiaru dokonań w rachunkowości. Wraz z implementacją zmienionych założeń Międzynarodowych Standardów Sprawozdawczości Finansowej został nałożony obowiązek sporządzania przez jednostki, które stosują MSSF, sprawozdania z wyniku i innych całkowitych dochodów. Pomiar dokonań na poziomie dochodu całkowitego, a nie wyniku finansowego, zmienia podejście do prezentowania informacji o efektach działalności jednostki w sprawozdaniu finansowym. W rachunkowości, w tym także w kontekście obowiązywania koncepcji dochodu całkowitego, niezwykle istotne jest odpowiednie (jednoznaczne, czytelne) prezentowanie informacji finansowych opisujących efekty działalności jednostki za dany okres. Odpowiednie przedstawianie informacji o dochodzie całkowitym powinno także realizować cechy jakościowe informacji wskazane w MSSF, np. porównywalność czy zrozumiałość.

Celem artykułu jest ocena aktualnego sposobu prezentacji dokonań (mierzonych dochodem całkowitym) przez wybrane spółki akcyjne w sprawozdaniu z sytuacji finansowej w kontekście koncepcji całkowitego dochodu oraz cechy porównywalności i zrozumiałości informacji finansowych, a także przedstawienie autorskiej propozycji rozwiązania w zakresie prezentacji całkowitego dochodu.

Aby osiągnąć wskazany cel, zastosowano metodę analizy regulacji MSSF (w szczególności zapisy MSR 1) i literatury z obszaru będącego przedmiotem badań oraz metodę syntezy i wnioskowania. W części empirycznej wykorzystano

sprawozdania finansowe sporządzone za 2022 r. przez wybrane spółki notowane na Giełdzie Papierów Wartościowych (GPW) w Warszawie. Na ich podstawie dokonano krytycznej oceny prezentowanych informacji o całkowitym dochodzie i jego składowych.

Dla realizacji celu niezbędne było udzielenie odpowiedzi na następujące pytania badawcze:

1. Jakie są relacje pomiędzy określeniami: dochód całkowity, wynik finansowy, kapitał z aktualizacji wyceny, zyski zatrzymane, kapitał rezerwowy, w świetle koncepcji całkowitego dochodu?

2. Czy sposób, w jaki wybrane spółki giełdowe prezentują całkowity dochód w sprawozdaniu z sytuacji finansowej, spełnia cechę porównywalności i zrozumiałości informacji?

Tezą postawioną w opracowaniu jest stwierdzenie, że brak spójności w sposobie prezentowania informacji o całkowitym dochodzie w sprawozdaniu finansowym przyjętym przez spółki nie odzwierciedla w pełni cech jakościowych informacji finansowych oraz koncepcji całkowitego dochodu.

Wskazany cel oraz postawione pytania badawcze warunkują strukturę artykułu. Pierwsze dwie jego części zostały opracowane z wykorzystaniem regulacji MSSF i literatury z dziedziny rachunkowości. Przedstawiono w nich istotę całkowitego dochodu i kategorii, które go tworzą, oraz sposób prezentacji informacji o całkowitym dochodzie w sprawozdaniu finansowym sporządzanym zgodnie z MSSF. W kolejnej części przeanalizowano sprawozdania finansowe wybranych spółek notowanych na GPW w Warszawie z punktu widzenia przyjętego przez nie sposobu ujawniania informacji o całkowitym dochodzie. Wszystkie spółki sporządzały sprawozdania według MSSF. W odpowiedzi na wnioski wynikające z dokonanej analizy wskazano propozycję rozwiązania w zakresie ujmowania informacji o całkowitym dochodzie w sprawozdaniu z sytuacji finansowej.

2. Przegląd dotychczasowych badań

Wprowadzenie do rachunkowości koncepcji całkowitego dochodu i obowiązku raportowania informacji o całkowitym dochodzie w sprawozdaniu finansowym jest przedmiotem wielu naukowych dyskusji i badań (np. Biddle i Choi, 2006; Walińska, 2009; Szychta, 2010, 2011; Bareja, 2011; Goncharov i Hodgson, 2011; Gierusz i Gawrońska, 2012; Bek-Gaik, 2013; Grabiński, 2013; Frenzel i Szychta, 2013; Gazzola i Amelio, 2014b; Mechelli i Cimini, 2014; Sajnóg, 2018, 2020; Wei, 2023).

Przeprowadzone w tym zakresie badania dotyczyły różnych aspektów związanych z całkowitym dochodem, m.in. jego istoty, struktury i nazewnictwa (np. Gierusz, 2005; Chambers i in., 2007; Walińska, 2009; Luty, 2010; Bareja, 2011; Szychta, 2011; Gierusz i Gawrońska, 2012; Bek-Gaik, 2013; Grabiński, 2013; Gazzola i Amelio, 2014a; Hodgson i Russell, 2014; Mechelli i Cimini, 2014;

Bataineh i Rababah, 2016; Acar i Karacer, 2017; Kuzior i Rówińska, 2017; Poniatowska i Rówińska, 2018, 2019).

Całkowity dochód był także przedmiotem badań w aspekcie rynku kapitałowego, powiązania ze stopą zwrotu i ceną akcji oraz pod względem jego wpływu na przyszłe zyski i prognozy analityków (Ball i Brown, 1968; Lev, 1989; Lipe, 1990; Friendzel i Szychta, 2013; Har i Ghafar, 2015; Isidro i Dias, 2017; Sajnog, 2018, 2020; Poniatowski, 2021). Wyniki tych badań nie są jednak spójne i nie odnoszą się do kwestii raportowania całkowitego dochodu.

Istotne z punktu widzenia rozwoju sprawozdawczości finansowej badania z zakresu całkowitego dochodu obejmowały ocenę użyteczności tej kategorii i możliwości jej wykorzystania jako parametru pomiaru dokonań oraz oceny efektywności działalności (np. Biddle i Choi, 2006; Bratten, Causholli i Khan, 2016; Acar i Karacer, 2017; Yousefi, Ahmad i Embong, 2017; Mahmood i Mahmood, 2019; Rusdiyanto i Narsa, 2019; Wang i in., 2021; Anderson i in., 2023). Opublikowane wyniki badań nie przyniosły jednoznacznych wskazań dotyczących oceny użyteczności i wykorzystania całkowitego dochodu jako parametru pomiaru dokonań jednostki. Część badaczy uznaje wynik finansowy netto za kategorię bardziej użyteczną dla interesariuszy informacji finansowych, część z kolei argumentuje przewagę informacyjną całkowitego dochodu nad wynikiem netto, twierdząc, że całkowity dochód stanowi istotną kategorię pomiaru efektywności działalności¹. Niemal wszyscy badacze podkreślają natomiast potrzebę pomiaru, raportowania i analizy dokonań jednostki.

Zdecydowanie mniej badaczy podejmuje problematykę samego raportowania informacji o całkowitym dochodzie (m.in. Kanagaretnam, Mathieu i Shehata, 2009; Bek-Gaik, 2013; Friendzel i Szychta, 2013; Poniatowska, 2013; Rówińska, 2013; Gad, 2014; Gierusz i in., 2021; Wei, 2023). Zauważyć można brak badań nad sposobem prezentowania w sprawozdaniu finansowym informacji o całkowitym dochodzie i jego składowych. W związku ze zidentyfikowaną luką badawczą wskazującą na brak badań, które pozwoliłyby na ocenę sposobu prezentowania informacji o całkowitym dochodzie w sprawozdaniu finansowym sporządzanym zgodnie z wymogami MSSF, zdecydowano się podjąć tę problematykę.

3. Istota całkowitego dochodu i elementy, które go kształtują

Kategoria dochodu całkowitego (*comprehensive income*) została wprowadzona do polskiej sprawozdawczości regulacjami MSSF w 2009 r. jako efekt implemen-

¹ Szerzej na ten temat napisano m.in. w pracach (Dhaliwal, Subramanyam i Trezevant, 1999; Gierusz, 2005; Dastgir i Velashani, 2008; Walińska, 2009; Luty, 2010; Bareja, 2011; Szychta, 2011; Gierusz i Gawrońska, 2012; Bek-Gaik, 2013; Grabiński, 2013; Gazzola i Amelio, 2014b; Hodgson i Russell, 2014; Mechelli i Cimini, 2014; Bataineh i Rababah, 2016; Mironiuc i Huian, 2016; Acar i Karacer, 2017; Poniatowska i Rówińska, 2018).

tacji zmodyfikowanego MSR 1 „Prezentacja sprawozdań finansowych”. Natomiast jako kategoria prawa bilansowego została ona po raz pierwszy zdefiniowana w 1980 r. w opublikowanym przez Amerykańską Radę Standardów Rachunkowości (FASB) SFAC nr 3 (Gierusz, 2013).

Całkowity dochód, nazywany w literaturze przedmiotu także wynikiem (zyskiem) całkowitym (np. Walińska, 2009; Szychta, 2011; Grabiński, 2013; Gad, 2014), wynikiem całościowym, zyskiem ogólnym, zyskiem wszechstronnym i zyskiem globalnym², definiowany jest jako zmiana wartości księgowej kapitału własnego (aktywów netto) z wyłączeniem transakcji z właścicielami w danym okresie. Zmiana ta zgodnie z koncepcją zysku całkowitego powinna być odzwierciedlona w wyniku danego okresu. Całkowity dochód stanowi miarę dokonań, którą jednostki ujmują w ramach sprawozdania finansowego. Mimo że dokonania te mogą być mierzone także innymi kategoriami, zwłaszcza w kontekście controllingu, to jednak informacje sprawozdawcze w dużej mierze są wykorzystywane przez wiele grup odbiorców.

W regulacjach MSSF całkowity dochód określany jest przez trzy kategorie wynikowe:

- całkowite dochody ogółem,
- zysk lub stratę,
- inne całkowite dochody.

Zgodnie z MSR 1 całkowite dochody ogółem definiowane są jako zmiana w kapitale własnym w ciągu okresu, która nastąpiła na skutek transakcji oraz innych zdarzeń, innych niż zmiany wynikające z transakcji dokonywanych z właścicielami występującymi w roli udziałowców (MSR 1, par. 7). Zysk lub strata to suma dochodów pomniejszona o koszty, z wyłączeniem składników innych całkowitych dochodów, natomiast inne całkowite dochody to pozycje dochodów i kosztów (w tym korekty wynikające z przeklasyfikowania), które nie zostały ujęte w wyniku zgodnie z tym, jak wymagają lub zezwalają inne MSSF (MSR 1, par. 7). Całkowite dochody ogółem obejmują wszystkie składniki zysku lub straty oraz innych całkowitych dochodów. Przykładowymi składnikami innych całkowitych dochodów są:

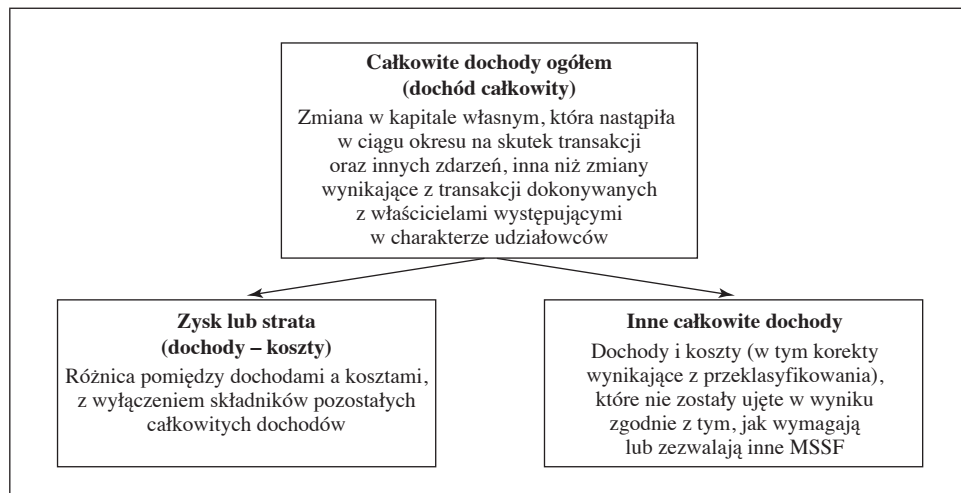
- nadwyżka z przeszacowania rzeczowych aktywów trwałych oraz aktywów niematerialnych,
- zyski i straty aktuarialne z tytułu programu określonych świadczeń,
- różnice kursowe wynikające z przeliczenia danych sprawozdawczych jednostki działającej za granicą,
- zyski i straty z wyceny aktywów finansowych wycenianych w wartości godziwej przez kapitał własny.

² Szerzej na temat różnych określeń tej kategorii pisali m.in. Walińska (2009), Szychta (2011), Bek-Gaik (2013) i Grabiński (2013).

Uogólniając, całkowity dochód w ujęciu MSSF obejmuje dwa podstawowe elementy:

- zysk lub strata okresu, czyli wynik prezentowany w rachunku zysków i strat,
- inne całkowite dochody nieujmowane bezpośrednio w wyniku finansowym okresu, lecz wykazywane w kapitale własnym.

Istotę i elementy całkowitego dochodu przedstawiono na rys. 1.



Rys. 1. Istota i podział całkowitego dochodu

Źródło: opracowanie własne na podstawie (Poniatowska, 2013; Poniatowska i Rówińska, 2018).

Zakres pojęciowy i struktura całkowitego dochodu jako kategorii wtórnej zależą od sposobu definiowania kategorii go tworzących, tj. dochodów³ i kosztów. Przyjęte w prawie bilansowym definicje dochodów i kosztów oparte są na podejściu bilansowym, w którym kategorie wynikowe definiowane są z perspektywy pozycji bilansowych jako zmiany wartości aktywów oraz pasywów i są one pochodną tych pozycji. Stąd też punktem wyjścia do obliczania wartości całkowitego dochodu jest zmiana wartości aktywów i zobowiązań, która powoduje przyrost lub zmniejszenie kapitału własnego w inny sposób niż wniesienie bądź wycofanie środków przez właścicieli (Założenia koncepcyjne MSSF, par. 4.25). Zmiany wartości aktywów lub zobowiązań zgodne z definicjami dochodów i kosztów zostają odzwierciedlone w dwojaki sposób:

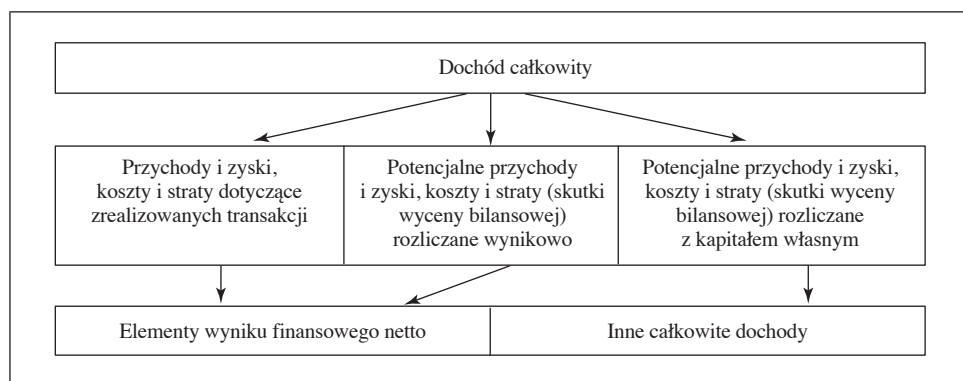
- w wyniku finansowym albo
- w kapitale własnym.

³ Zgodnie z regulacjami MSSF definicja dochodów obejmuje przychody i zyski (por. Założenia koncepcyjne MSSF, par. 4.29).

Analizując składowe całkowitego dochodu, którymi są dochody (przychody i zyski) oraz koszty i straty, w strukturze całkowitego dochodu można wyodrębnić dochody oraz koszty i straty dotyczące:

- skutków transakcji zrealizowanych w danym okresie (dochody i koszty zrealizowane),
- skutków wyceny bilansowej, rozliczanych wynikowo (dochody i koszty niezrealizowane),
- skutków wyceny bilansowej, rozliczanych z kapitałem własnym (dochody i koszty niezrealizowane).

Strukturę tak interpretowanego całkowitego dochodu przedstawiono na rys. 2.



Rys. 2. Struktura całkowitego dochodu

Źródło: (Gierusz i in., 2021, s. 139).

Podsumowując, całkowity dochód jako kategoria prawa bilansowego w ujęciu MSSF różni się od tradycyjnego wyniku finansowego netto tym, że dodatkowo obejmuje dochody i koszty rozliczane z kapitałem własnym. Mają one – podobnie jak skutki wyceny rozliczane poprzez wynik finansowy – charakter hipotetyczny, często szacunkowy. Stanowią zatem typowy element polityki rachunkowości jednostki gospodarczej, w tym polityki zarządzania wynikiem.

4. Prezentacja informacji o całkowitym dochodzie w sprawozdaniu finansowym

Dochód całkowity jest kategorią raportowaną w kilku elementach sprawozdania finansowego, tj.:

- sprawozdaniu z wyniku i innych całkowitych dochodów,
- sprawozdaniu ze zmian w kapitale własnym,
- sprawozdaniu z sytuacji finansowej.

Elementem sprawozdania finansowego, który w całości dotyczy kategorii całkowitego dochodu, jest sprawozdanie z wyniku i innych całkowitych dochodów, nazywane również sprawozdaniem z zysków lub strat i innych całkowitych dochodów czy sprawozdaniem z całkowitych dochodów. Zgodnie z MSSF celem sporządzania tego sprawozdania jest dostarczenie informacji o wyniku finansowym, dochodach i kosztach, w tym zyskach i stratach (MSR 1, par. 9).

W regulacjach MSSF nie określono wzoru sprawozdania z całkowitych dochodów, podano jedynie minimalny zakres informacji, które należy w nim przedstawiać, oraz ogólną strukturę obejmującą:

- tradycyjny rachunek zysków i strat,
- sprawozdanie z innych całkowitych dochodów, prezentujące zmiany w kapitale własnym niezwiązane z właścicielami oraz ich skutki podatkowe.

Zaletą takiego sposobu prezentacji informacji o całkowitym dochodzie jest niewątpliwie podział sprawozdania na dwie sekcje i wyodrębnienie części innych całkowitych dochodów, w której przedstawia się dochody i koszty rozliczane kapitałowo. Natomiast w samej formule sprawozdania z wyniku i innych całkowitych dochodów (według MSR 1), pozostawiającej dużą swobodę w sposobie prezentacji dochodów, można wskazać wiele braków i mankamentów⁴. Brak wzoru tego sprawozdania i ujmowanie w nim minimalnego zakresu informacji powoduje, że w praktyce w sporządzanych sprawozdaniach mogą wystąpić istotne różnice dotyczące zakresu i szczegółowości prezentowanych informacji, w efekcie czego sprawozdania te są mało porównywalne. Ogranicza to możliwości analizy i interpretacji.

Oprócz sprawozdania z wyniku i innych całkowitych dochodów informacja o całkowitym dochodzie prezentowana jest także w sprawozdaniu ze zmian w kapitale własnym oraz sprawozdaniu z sytuacji finansowej, co wynika z definicji całkowitego dochodu i interpretowania go jako elementu kapitału własnego. Sprawozdanie ze zmian w kapitale własnym jest sprawozdawcą informacją o wszystkich zmianach w kapitale własnym, zarówno tych, które są efektem transakcji z właścicielami, jak i tych, które nie są skutkiem tych transakcji, a więc jest informacją o całkowitych dochodach. Podobnie jak w przypadku sprawozdania z wyniku i innych całkowitych dochodów w MSR 1 nie określono wzoru tego sprawozdania – podano tylko minimalny zakres prezentowanych w nim informacji i jego strukturę. Zgodnie z MSR 1 w odniesieniu do każdego składnika kapitału własnego wymaga się uzgodnienia wartości bilansowej na początek i na koniec okresu z wydzieleniem:

- zysku lub straty za okres,
- innych całkowitych dochodów,
- transakcji z właścicielami (MSR 1, par. 106, lit. D).

⁴ Szerzej na ten temat zob. (Gierusz, 2013).

Przykładem „każdego składnika kapitału własnego” są np. kapitały wniesione, inne całkowite dochody oraz zyski zatrzymane (MSR 1, par. 108).

Kolejnym elementem sprawozdania finansowego, który informuje o całkowitym dochodzie, jest sprawozdanie z sytuacji finansowej. Ze względu na nieprecyzyjne, niejasne i istotnie ograniczone regulacje MSSF dotyczące sposobu raportowania informacji o całkowitym dochodzie w tym sprawozdaniu budzi ono najwięcej kontrowersji. Jak wynika z MSR 1, celem sporządzenia sprawozdania z sytuacji finansowej jest m.in. dostarczenie informacji o kapitale własnym (MSR 1, par. 9), kategorii, która ma kluczowe znaczenie w ocenie sytuacji majątkowej i finansowej jednostki. Zgodnie z obecnie obowiązującym w rachunkowości podejściem bilansowym elementem kapitału własnego jest całkowity dochód, na który składają się poza tradycyjnym wynikiem finansowym netto także inne całkowite dochody. Taka struktura całkowitego dochodu nie znajduje jednak odzwierciedlenia w sprawozdaniu z sytuacji finansowej. MSR 1, określając minimalny zakres informacji prezentowanych w sprawozdaniu z sytuacji finansowej, wskazuje, że w ramach kapitału własnego należy wykazać udziały niedające kontroli ujęte w kapitale własnym, wyemitowany kapitał podstawowy oraz pozostałe kapitały przypisane udziałowcom jednostki dominującej. Z zapisów MSSF wynika, że kapitał własny obejmuje trzy różne pozycje (Gos, Hendryk i Hońko, 2017):

- kapitał podstawowy,
- zyski zatrzymane,
- inne składniki kapitału własnego.

Zatem całkowity dochód jako element kapitału własnego powinien być ujęty w ramach zysków zatrzymanych bądź innych składników kapitału własnego. MSR 1 nie rozwiązuje tej kwestii, dając jednostkom dużą dowolność i swobodę w tym zakresie. W praktyce rodzi to liczne problemy i kontrowersje, szczególnie jeśli chodzi o rozumienie i interpretację zarówno kategorii zysków zatrzymanych, jak i innych składników kapitału własnego. W regulacjach zawartych w MSR 1 posłużono się np. pojęciem zysków zatrzymanych, jednak nie zdefiniowano tej kategorii⁵. Stąd też pojawia się pytanie: jaka jest relacja zysków zatrzymanych do całkowitego dochodu i jego składowych? Z zapisu określającego przykłady składników kapitału własnego wynika, że obejmują one kapitały wniesione, inne dochody całkowite oraz zyski zatrzymane – można interpretować, że w skład zysków zatrzymanych wchodzi wynik okresu, nie obejmują one natomiast innych całkowitych dochodów. Pozycja innych całkowitych dochodów powinna być w związku z tym klasyfikowana jako inne składniki kapitału własnego. Przedstawiona interpretacja nie wynika jednak wprost z wytycznych dotyczących raportowania całkowitych dochodów w sprawozdaniu z sytuacji finansowej. Problematiczny jest także

⁵ Szerzej na temat zysków zatrzymanych zob. (Gos, Hendryk i Hońko, 2017).

sposób ujęcia innych całkowitych dochodów w grupie innych składników kapitału własnego. Na inne składniki kapitału własnego składają się bowiem różne pozycje kapitału będące z istoty rodzajem kapitału, jak np. kapitał zapasowy czy kapitał rezerwowy oraz pozycje wynikające z wyceny bilansowej aktywów i pasywów, które z natury nie odpowiadają wprost istocie innych kapitałów prezentowanych w bilansie (Poniatowska i Rówińska, 2019). W związku z tym powstają kolejne pytania dotyczące poprawności merytorycznej prezentowania informacji o innych całkowitych dochodach jako pozostałych składnikach kapitału własnego. Czy potencjalne zyski/straty, które zostały ujęte w związku z wyceną bilansową, mogą być określane mianem kapitału, np. z aktualizacji wyceny?⁶ Jak pisze Smejda, „w koncepcji całkowitego dochodu nie występuje samodzielne zdefiniowanie kapitału, lecz opiera się na definicji aktywów i zobowiązań, i ma charakter rezydualny. W nowym bilansowym podejściu do kapitału natura kapitału jako kategorii ekonomicznej została zakwestionowana, gdyż kapitał może tu wzrastać drogą wycen” (Smejda, 2011, s. 510).

Podsumowując problematykę raportowania informacji o całkowitym dochodzie w sprawozdaniu finansowym, należy stwierdzić, że brak wzorów poszczególnych elementów sprawozdań finansowych oraz dopuszczona przez MSSF duża swoboda prezentacji całkowitych dochodów powodują, że jednostki mogą wykazywać istotne różnice dotyczące zarówno stosowanego nazewnictwa, jak i zakresu oraz szczegółowości prezentowanych informacji.

5. Analiza informacji ujawnianych przez spółki

Na potrzeby badań losowo wybrano 106 spółek notowanych na GPW w Warszawie, sporządzających sprawozdania finansowe według MSSF. Analizie poddano sprawozdania finansowe spółek za 2022 r. Dokonano takiego doboru spółek, by reprezentowany był każdy z głównych sektorów rynku GPW w Warszawie. Przed przystąpieniem do badania przyjęto bowiem, że sposób prezentacji całkowitego dochodu może być podobny w ramach sektora. I tak, przeanalizowano sprawozdania finansowe: 23 spółek należących do sektora Chemia i surowce, 25 spółek z sektora Dobra konsumpcyjne, 17 spółek z sektora Finanse, 13 spółek z sektora Handel i usługi, 3 spółki z sektora Ochrona zdrowia, 8 spółek z sektora Paliwa i energia, 9 spółek z sektora Produkcja przemysłowa i budowlano-montażowa oraz 8 spółek z sektora Technologie.

Przeanalizowano treść trzech elementów sprawozdania finansowego każdej spółki, a mianowicie: sprawozdanie z sytuacji finansowej, sprawozdanie z wyniku i innych całkowitych dochodów, zestawienie zmian w kapitale własnym.

⁶ Szerzej na ten temat zob. (Poniatowska i Rówińska, 2019).

Analiza treści sprawozdań nie potwierdziła założeń autorek o sektorowym podobieństwie sposobu prezentacji informacji o dochodzie całkowitym. W związku z tym podjęto próbę podziału spółek na dwie grupy:

- spółki objęte giełdowymi indeksami cenowymi: WIG20, mWIG40 i sWIG80 (71 spółek w próbie badawczej),
- pozostałe spółki (35 spółek w próbie badawczej).

Jednak ten podział spółek również nie pozwolił na wskazanie wspólnych cech odnoszących się do raportowania całkowitego dochodu. Dlatego też wnioski z badań nie odwołują się do żadnego z przyjętych wstępnie kryteriów klasyfikacji spółek.

W pierwszej kolejności analizie poddano sprawozdanie z wyniku i innych całkowitych dochodów oraz zestawienie zmian w kapitale własnym. Są to sprawozdania najmniej kontrowersyjne z punktu widzenia prezentacji dochodu całkowitego. Generalnie zaobserwowano pełne powiązanie tych dwóch elementów sprawozdania w zakresie prezentowania informacji o dochodzie całkowitym. W zestawieniu zmian w kapitale własnym spółki jednoznacznie wskazują wartość wyniku finansowego netto oraz innych całkowitych dochodów roku bieżącego, które są szczegółowo opisane w sprawozdaniu z wyniku i innych całkowitych dochodów. Zestawienie zmian w kapitale własnym informuje także o składowych skumulowanego całkowitego dochodu (wynik finansowy netto, niepodzielony wynik z lat ubiegłych, skumulowane inne całkowite dochody). Wyjątek stanowią trzy spółki, które w zestawieniu zmian w kapitale własnym zaprezentowały wyłącznie „skumulowany wynik” (bez wskazania wartości wyniku finansowego, którą określić można wyłącznie na podstawie sprawozdania z wyniku i innych całkowitych dochodów).

W dalszej kolejności przeanalizowano treść sprawozdania z sytuacji finansowej, w części prezentującej kapitały własne spółek. Pozycje, w jakich spółki prezentują elementy kapitału własnego, są zbieżne z tymi prezentowanymi w ramach zestawienia zmian w kapitale własnym. Struktura kapitału własnego, przyjęta przez spółki do prezentacji tych elementów w pasywach sprawozdania z sytuacji finansowej, rzadko zapewnia czytelne informacje o wyniku finansowym czy innych całkowitych dochodach. W tabeli 1 przedstawiono pozycje kapitału własnego, które stosują spółki. Szarym kolorem zaznaczono pozycje kapitału własnego, które zawierają (lub mogą zawierać) informacje na temat wyniku finansowego oraz innych całkowitych dochodów.

Analizując sposób prezentacji informacji o wyniku finansowym zauważamy, że tylko 22 spółki bezpośrednio prezentują w pasywach wartość wyniku finansowego, przy czym 19 z nich prezentuje oddzielnie zarówno wynik finansowy netto, jak i wynik finansowych z lat ubiegłych, z kolei pozostałe spółki prezentują te dwie kategorie łącznie (pozycja 3 w tabeli 1). W zdecydowanej większości przypadków (101 spółek) wynik finansowy ujmowany jest w ramach pozycji „zyski zatrzymane” (pozycja 8 w tabeli 1). Trzy spółki zdecydowały się na prezentację skumulowanego

wyniku, będącego sumą: wyniku finansowego roku bieżącego, niepodzielonego wyniku finansowego z lat ubiegłych oraz skumulowanych innych całkowitych dochodów. Brak spójności rozwiązań w zakresie prezentowania wyniku finansowego i całkowitego dochodu nie sprzyja porównywalności informacji między spółkami oraz ich jednoznacznemu zrozumieniu, a także utrudnia przeprowadzanie analiz.

Ponad 79% analizowanych spółek nie wskazuje w pasywach bezpośrednio wartości wyniku finansowego. By wyczytać tę wartość, należy sięgnąć do sprawozdania z całkowitych dochodów albo zestawienia zmian w kapitale własnym. Jak już wspomniano wcześniej, taki sposób prezentacji wyniku finansowego „zaciemnia” informacje na temat jednostki i jej bieżących dokonań, a także może sprawiać, że ten element sprawozdania jest niejasny dla niektórych odbiorców. Warto podkreślić, że wynik finansowy jest jedną z podstawowych kategorii, którą zainteresowani są zwłaszcza zewnątrzni interesariusze informacji finansowych. Pomimo obowiązku raportowania całkowitego dochodu wynik finansowy nadal jest dla nich podstawą podejmowania wielu decyzji.

Tabela 1. Struktura kapitału własnego prezentowana w pasywach sprawozdania z sytuacji finansowej

Pozycja kapitału własnego	Liczba spółek prezentujących daną kategorię
1. Kapitał zakładowy / podstawowy	106
2. Kapitał z emisji akcji powyżej ich wartości nominalnej	64
3. Wynik finansowy łącznie z wynikiem z lat ubiegłych	22
4. Skumulowany wynik	3
5. Akcje własne	27
6. Kapitał z aktualizacji wyceny / inne całkowite dochody	26
7. Szczegółowe tytuły innych całkowitych dochodów ^a	39
8. Zyski zatrzymane	101
9. Kapitał zapasowy	21
10. Kapitały rezerwowe	57

^a W ramach kapitału własnego niektóre jednostki prezentowały konkretne tytuły innych całkowitych dochodów, np. kapitał z wyceny instrumentów finansowych, kapitał z rachunkowości zabezpieczeń czy różnice kursowe z przeliczenia jednostek zagranicznych.

Źródło: opracowanie własne.

Obok wyniku finansowego dokonania jednostki obejmują również inne całkowite dochody. Ich prezentacja w pasywach sprawozdania z sytuacji finansowej spółek jest jeszcze bardziej niejednoznaczna i zróżnicowana. Inne całkowite dochody są prezentowane w pozycjach 6, 7, 8 i 10 wymienionych w tabeli 1. 65 spółek prezen-

tuje inne całkowite dochody w oddzielnej pozycji kapitału własnego (pozycje 6 i 7 w tabeli 1), z czego 39 wskazuje konkretne ich tytuły (w dużej mierze są to spółki należące do sektora Finansse). Wynikałoby z tego, że pozostałe spółki prezentują inne całkowite dochody w ramach zysków zatrzymanych albo kapitału rezerwowego. Nie jest to jednak tak jednoznaczne, ponieważ są spółki, które prezentują inne całkowite dochody w dwóch, a nawet trzech pozycjach, np. jako kapitał z wyceny instrumentów finansowych, jako element zysków zatrzymanych i jako element kapitału rezerwowego. W zależności od tytułu innych całkowitych dochodów spółki prezentują je w różnych pozycjach kapitału własnego. Taki sposób przedstawiania innych całkowitych dochodów zdecydowanie utrudnia ich identyfikację w kapitale własnym, a tym samym możliwość wykorzystania ich przez interesariuszy do analiz. Na podstawie zestawień zmian w kapitale własnym analizowanych spółek zweryfikowano umiejscowienie innych całkowitych dochodów w pozycjach kapitału własnego. Wyniki przedstawiono w tabeli 2.

Tabela 2. Prezentacja innych całkowitych dochodów w kapitale własnym

Pozycja kapitału własnego, w ramach której spółki prezentowały inne całkowite dochody	Liczba spółek
1. Wyłącznie bezpośrednio jako kapitał z aktualizacji wyceny (inne całkowite dochody) lub szczegółowe tytuły innych całkowitych dochodów ^a	34
2. Wyłącznie jako element zysków zatrzymanych	21
3. Wyłącznie jako element kapitału rezerwowego	16
4. W dwóch pozycjach: jako szczegółowy kapitał z aktualizacji oraz w zyskach zatrzymanych	25
5. W trzech pozycjach: jako szczegółowy kapitał z aktualizacji, w zyskach zatrzymanych oraz w kapitale rezerwowym	1
6. Nie wykazują innych całkowitych dochodów	9
Razem	106

^a Zgodnie z wyjaśnieniami do tabeli 1.

Źródło: opracowanie własne.

Spółki w zróżnicowany sposób prezentują inne całkowite dochody w pasywach sprawozdania z sytuacji finansowej. 67% analizowanych spółek (71 spółek) przypisało inne całkowite dochody do jednej pozycji kapitału własnego (pozycje 1–3 w tabeli 2). Są to różne pozycje, więc wyraźnie zaobserwować można odmienne podejścia jednostek w tym zakresie. Zdaniem autorek niniejszego artykułu przeważa najbardziej czytelne rozwiązanie, a mianowicie prezentacja innych całkowitych dochodów w oddzielnej pozycji (oddzielnych pozycjach) kapitału własnego (34 spółki).

Na uwagę zasługuje to, że 26 spółek prezentuje inne całkowite dochody w ramach więcej niż jednej pozycji kapitału własnego (pozycje 4–5 w tabeli 2). Takie zróżnicowanie sposobu prezentacji innych całkowitych dochodów z pewnością nie sprzyja ich zrozumieniu oraz właściwej ich interpretacji przez odbiorców (zewnętrznych i wewnętrznych).

Analizując sposób prezentacji zarówno wyniku finansowego, jak i innych całkowitych dochodów, należy zwrócić uwagę na kategorię „zyski zatrzymane”. Jak już wspomniano, nie jest to kategoria jednoznacznie rozumiana. Analiza sprawozdań spółek pozwoliła na wyciągnięcie wniosków w tym zakresie (tabela 3).

Tabela 3. Struktura zysków zatrzymanych analizowanych spółek

Składowa zysków zatrzymanych	Liczba spółek
Wynik finansowy	99
Inne całkowite dochody	52
Dywidendy	47
Emisja akcji	4
Nie wykazują zysków zatrzymanych ^a	15

^a Są to spółki, które prezentują wynik finansowy w samodzielnej pozycji kapitału własnego.

Źródło: opracowanie własne.

Tak jak wynik finansowy – według polityki rachunkowości spółek – generalnie stanowi element zysków zatrzymanych, tak inne całkowite dochody zostały do nich zakwalifikowane tylko przez 52 spółki. Co ciekawe, żadna z analizowanych spółek nie zalicza do tej grupy kapitału zapasowego tworzonego z zysku. Z dokonanej analizy sprawozdań finansowych spółek wynika, że pod nazwą „zyski zatrzymane” prezentowany jest wynik finansowy (roku bieżącego i niepodzielony z lat ubiegłych). Zdaniem autorek nie jest to rozwiązanie poprawne merytorycznie, choć – jak wspomniano wcześniej – żadne regulacje prawne nie definiują kategorii zysków zatrzymanych. Biorąc pod uwagę rozpatrywaną tutaj kategorię dochodu całkowitego, jeżeli jednostki prezentują w kapitale własnym zyski zatrzymane, to tą kategorią powinny zostać objęte: wynik finansowy netto, niepodzielony wynik finansowy z lat ubiegłych, inne całkowite dochody. Jak pokazuje przeprowadzona analiza, nie jest to powszechna praktyka.

Dokonana analiza, w której zbadano wybrane spółki, nie wyczerpuje możliwości analizy sposobu prezentacji dochodu całkowitego w sprawozdaniu finansowym. Ma ona charakter pilotażowy, a wynikające z niej wnioski wskazują na możliwość podjęcia dalszych badań, zwłaszcza w kontekście prezentacji wyniku finansowego oraz innych całkowitych dochodów w sprawozdaniu z sytuacji finansowej przez spółki innych branż giełdowych czy z wyodrębnieniem spółek objętych indeksem WIG ESG.

6. Autorska propozycja prezentacji dochodu całkowitego w sprawozdaniu z sytuacji finansowej

Dokonana analiza treści sprawozdań finansowych 106 spółek i stwierdzenie braku spójności, jeśli chodzi o sposób prezentacji informacji o wyniku finansowym, innych całkowitych dochodach i dochodzie całkowitym, zainspirowały autorki do opracowania propozycji rozwiązania w tym zakresie. Biorąc pod uwagę, że odbiorcami informacji sprawozdawczych są nie tylko fachowcy od rachunkowości, ale także osoby zainteresowane ich wykorzystaniem w procesie podejmowania decyzji, różne – jak zaprezentowano w artykule – podejścia do sposobu prezentacji całkowitego dochodu jako podstawowego miernika dokonań jednostki (w myśl koncepcji całkowitego dochodu wprowadzonej w MSSF) stwarzają problemy interpretacyjne i „zaciemniają” obraz jednostki (np. w kontekście analizy wskaźnikowej). Dlatego zdaniem autorek warto rozważyć możliwość wprowadzenia wymogu prezentacji dokonań jednostki w sprawozdaniu z sytuacji finansowej w oddzielnej pozycji kapitału własnego, co znacznie poprawi właściwą interpretację informacji ujętych w grupie kapitałów własnych. Dzięki temu zachowana zostanie także informacyjna zgodność trzech elementów sprawozdania finansowego: sprawozdania z sytuacji finansowej, sprawozdania z wyniku i innych całkowitych dochodów oraz zestawienia zmian w kapitale własnym. W tabeli 4 przedstawiono proponowaną strukturę kapitału własnego.

Tabela 4. Autorska propozycja sposobu prezentacji dokonań jednostki w sprawozdaniu z sytuacji finansowej

Aktywa	Pasywa
(...)	A. Kapitał własny (...) Całkowity dochód roku bieżącego, w tym: Wynik finansowy Inne całkowite dochody Całkowity dochód z lat ubiegłych, w tym: Niepodzielony wynik finansowy Inne całkowite dochody (...)

Źródło: opracowanie własne.

Wartość dokonań jednostki jest jedną z ważniejszych informacji, jakiej oczekują odbiorcy sprawozdań finansowych, zarówno ci zewnętrzni, jak i wewnętrzni. Skoro w myśl regulacji MSSF dokonania jednostki mierzone są kategorią całkowitego dochodu, to – zdaniem autorek – powinny one być jednoznacznie i czytelnie prezentowane w sprawozdaniu finansowym, we wszystkich jego elementach. Obecnie

zaobserwować można jednak tendencję, by w sprawozdaniu z sytuacji finansowej nie prezentować wprost (w oddzielnej pozycji) dokonań jednostki. Są one wskazane w sprawozdaniu z wyniku i innych całkowitych dochodów, jak również w zestawieniu zmian w kapitale własnym. Zdaniem autorek kategoria dochodu całkowitego (czy wyniku finansowego i innych całkowitych dochodów) jest na tyle istotna, że powinna znaleźć bezpośrednie odzwierciedlenie w pasywach jako samodzielna pozycja kapitału własnego.

7. Wnioski

Przeprowadzona analiza sposobu prezentowania informacji o wyniku finansowym i innych całkowitych dochodach pozwoliła na wskazanie wniosków stanowiących odpowiedź na postawione pytania badawcze.

Wynikający z obowiązujących regulacji MSSF brak wymogu bezpośredniego prezentowania wartości wyniku finansowego oraz innych całkowitych dochodów w sprawozdaniu z sytuacji finansowej (w samodzielnych pozycjach kapitału własnego) nie sprzyja realizacji cechy porównywalności i zrozumiałości informacji, może prowadzić do zniekształcenia informacji wykorzystywanych do oceny sytuacji spółki przez różne grupy interesariuszy tych informacji, a także rodzi problemy z jednoznaczną interpretacją kategorii sprawozdawczych.

Dla zachowania pełnych powiązań między poszczególnymi elementami sprawozdania finansowego, jak również dla wyraźnego odzwierciedlenia koncepcji całkowitego dochodu zasadne wydaje się wprowadzenie kategorii dochodu całkowitego do struktury kapitału własnego, co przyczyni się do poprawy jakości informacji ujmowanych w sprawozdaniu z sytuacji finansowej. Rozwiązanie to podkreśli także związek z koncepcją całkowitego dochodu, wskazującą dochód całkowity jako miarę dokonań sprawozdawczą przez jednostki stosujące regulacje MSSF. Dokonania jednostki są na tyle istotną kategorią, że powinny być prezentowane w sposób jednoznaczny, niebudzący żadnych merytorycznych wątpliwości.

Wkład autorów

Wkład autorek w powstanie artykułu jest następujący: Lucyna Poniatowska 50%, Małgorzata Rówińska-Kral' 50%.

Konflikt interesów

Autorki deklarują brak konfliktu interesów.

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