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CONTENTS

THE ROLE OF USER ENGAGEMENT IN ELECTRONIC WORD-OF-MOUTH AND ONLINE PERFORMANCE

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Abstract: Being a member of social media channels involves the use of many engagement activities, including reposting content, commenting on posts and expressing interest. Online user engagement has been proposed to encourage various positively-valenced interactions between consumers and online brands, with electronic Word-Of-Mouth being one of the most significant. Despite the extensive research that has been carried out in the field of social media, the number of quantitative studies exploring the effects of the various factors that affect the performance of a social media channel is still limited. This study examines the relationship between online user engagement and eWOM, also addressing the effects on user interaction advertisement results. The data set was provided by a large YouTube music channel and, in contrast with other similar studies, the data extracted from YouTube analytics that represent actual user values. All insights were selected from a 6-year period. During this time, almost 500 music videos were uploaded. In total, 83 831 subscribers were included in the data set. Statistical analyses showed that user engagement significantly affects eWOM. Accordingly, the role of eWOM in organic results, such as views and number of subscribers, was verified. Finally, a significant mediating role of eWOM in the relationship between user engagement and advertisement results was reported. The results of the current study are highly important for administrators of social media video channels, as they provide enough information on how to develop their promotional strategy and how to best manage the content they want to upload.

Keywords: Social Media, eWOM, YouTube, User Engagement.

1. Introduction

The rise of the Internet has created online forums, social media and communities which have increased the scope and implications of electronic Word-of-Mouth (eWoM) for customers and firms (Dwyer, 2007; Kozinets et al., 2010; Malthouse et al., 2013). The technological advances presented by social networking and the sites of firms result in more access to massive audiences, with the possibility of identifying and establishing regular, direct and customised interactions (Tahir M. Nisar et al., 2018). The resulting interactions, participation and sharing

have led to several changes in the way market agents view and use technology, as well as provide new innovative methods for selling products and services (Dellarocas, 2003; Spaulding, 2010). While it is one thing to simply read or follow a social media post, making the decision to publicly contribute your reaction or opinion in response to the post indicates that an individual is more invested, aware and attentive (i.e. more engaged) with the content. This ability to act, interact and co-create online, as a key characteristic of online media, distinguishes it from other media platforms (Ksiazek et al., 2016). These researchers theorise a continuum of engagement, from exposure to interactivity, where more (quantity) and better (quality) ways to interact with content and with other users indicate deeper engagement. Given the possibility that consumers now directly interact with companies on social media, several important theoretical and empirical questions arise: What happens if consumers engage with a company on social media, such as commenting on its Facebook posts? Does it make a financial difference if consumers leave positive or negative comments on a company's social media posts? How can a company tell that its social media marketing is working? (Yoon et al., 2018). In general, it is important for a company with a social media channel to understand how the user engages with the content and if all this leads to positive word-of-mouth and the creation of new users and impressions.

YouTube is one of the largest media platforms used for music and video sharing. Researchers have examined a diverse set of consequences of eWoM, e.g. brand purchase probability (East, Hammond, and Lomax, 2008), a tendency to recommend (Liu, 2006), involvement (Muniz, and O'Guinn, 2001), product adoption (Algesheimer, and Wangenheim, 2006; Thompson and Sinha, 2008) and feedback on products and services (Grégoire, Laufer, and Tripp, 2010; Hennig-Thurau, 2004). Similarly, several studies have examined the antecedents of eWoM, e.g. affective characteristics of the message (Berger, and Milkman, 2012), relational factors (Chu, and Kim, 2011) and individual traits (Mowen, Park, and Zablah, 2007). The main objective of the current study is to examine the relationship between online user engagement and eWOM, also addressing the effects on user interaction advertisement results. Most of the existing literature has used either qualitative data (e.g. online texts) or questionnaires for their research. In contrast, in the current study, the data set has been extracted from original YouTube insights and represents objective values.

At the beginning, the paper examines the current state of research in the field of User Engagement and eWOM. In terms of the research method, a data set was extracted from original YouTube insights, so as to construct variables that represent the three main constructs: user engagement, eWOM and performance. After filtering the raw data set that came from YouTube insights, six main variables were extracted. eWOM (Shares), Engagement (Likes and Comments), Subscribers, Views and Ad Impressions have been put into the data set. Linear, multiple and regression with a mediation effect have been used as models to examine the role of both eWOM and Engagement and confirm the main hypothesis that eWOM grows exponentially when affected by the engagement a user has with the content. Moreover, it has

been hypothesised that eWOM plays a significant role as a predictor in the number of subscribers and video views and as a mediator between User Engagement and the number of Advertisements Impressions. After confirming the initial hypotheses, the managerial implications the research has in a social media strategy and other organisations have been acknowledged, and future research topics, such as examining various combinations of social media channels, have been proposed.

2. Literature Review

2.1. Brand and community engagement

Brand engagement, as described by Mollen and Wilson (2010), is divided into consumer engagement: "the cognitive and affective commitment to an active relationship with the brand as personified by the website or other computer-mediated entities designed to communicate brand value"; and online brand engagement, which is far more expressive than online involvement, as it involves an interactive relationship between the customer and the product that he/she engages with.

By focusing on the user-brand engagement and how the brand marketing strategy affects customer behaviour, a theory states that engagement is an alignment between the customer and the goals of the firm (Van Doorn et al., 2010). Depicting this in the media industry, engagement is the willingness of both the brand and the fan of the brand to promote a positive feeling about a product. Brands with increased equity are more likely to accommodate higher levels of engagement (Van Doorn et al., 2010). High customer engagement can support brands to attract new customers and keep old customers (Wangenheim, and Bayón, 2007). Community engagement refers to the positive perceptions and feedback of members to their participation in activities held by the community (Algesheimer, Dholakia, and Herrmann, 2005). Such activities include both online activities (shares, likes, etc.) and offline activities (meeting in the physical world). Engagement in "a specialised, non-geographically bound, online community, based on social communications and relationships among a brand's consumers" (De Valck et al., 2009) could be considered as an important area of research, since the nature of online communities has still not been fully documented.

2.2. Social Media Engagement

In social media, engagement is a measure of an individual's cognitive response, personal or emotional connection and/or actions (Li, Berens, and de Maertelaere, 2013). After creating a social media post, engagement can occur in various ways (shares, likes, comments), contributing to the positive effect of a brand's product. Studies found a significant and positive

relationship between a firm's social media marketing strategies and users' consumption and contribution of engagement, indicating the importance of social media marketing efforts in engaging users online (Mishra, 2019).

Acquiring user interest is vital for companies to expand their customer base, but it is also important to build up long-term "user loyalty" in order to prevent current customers from becoming dissatisfied and leaving (Kwon, and Wen, 2010). When interacting with customers over the Internet, Ryan and Jones (2012) suggest effective social media marketing is based on subtle consumer engagement and "leaving the sledgehammer approach to product promotion at home". This is mainly the result of successful customer care instead of forced advertising. Social media can assist in the the humanisation of a brand by connecting the product with customers and giving it a greater personality (Ellison, Steinfield, and Lampe, 2007). This is important, as social media is effective due to its two-way communication (Grieve et al., 2013). Chaffey and Ellis-Chadwick (2012) have also addressed the policy of brands that motivate social media users to express themselves and the success in using the wisdom of the crowd to answer their business problems.

Social media allows brands to discover exactly what customers are interested in and then use this information to tailor their products and services in order to meet those needs (Chen, Lu, Wang, Zhao, and Li, 2013; Choi, and Bazarova, 2015). They can be defined as the "umbrella term for the web-based software and services that allow users to come together online and exchange, discuss, communicate and participate in any form of social interaction" (Ryan, and Jones, 2012) and is one of the central features of Web 2.0, allowing for greater interaction between groups of people over the Internet (Chen et al., 2013; Cheung et al., 2011; Choi, and Bazarova, 2015). The emergence of social media has dramatically influenced marketing practices. Conventional, well-established marketing practices are not highly influential anymore and, in many cases, can backfire on a firm (Fournier, and Avery, 2011; Hennig-Thurau, Hofacker, and Bloching, 2013). Therefore, there is an ever-increasing need for updating the understanding of social media and to further develop knowledge which suits the imperatives of marketing in social media environments (Hennig-Thurau et al., 2013). One main challenge for marketers has been to see how their efforts can pay off and how their social media activities can influence important brand related variables (Hoffman, and Fodor, 2010).

Being a member of social media communities involves the use of various expressive activities, including posting content by oneself, reposting content from others, commenting on others' posts and messaging with others.

The content, valence and volume of conversations about a brand or a topic among consumers can be a good proxy for their preferences and hence a predictor of important performance variables, such as sales or the performance of a brand (Asur, and Huberman, 2010; Kumar, Bhaskaran, Mirchandani, and Shah, 2013; Sonnier, McAlister, and Rutz, 2011). Word-of-mouth (Kumar et al., 2013), positive and neutral comments (Sonnier et al., 2011) and

the volume of content about a brand (Asur, and Huberman, 2010) are the main factors that affect them the most.

User behaviour can be categorised depending on the amount of content that someone produces during his interaction with a community. Past studies have indicated that posting frequency, the timing of posting, message modality and message appeal may influence the effectiveness of content management. In contrast to advertising on traditional media, such as TV, which mainly aims to increase exposure, the marketing practice on social media often has dual goals: generating business exposure and managing brand relationship with consumers.

2.3. WoM and eWoM

Word-Of-mouth (WOM) has a major influence on consumer purchase decisions, especially in the case of new products for which awareness needs to be created and product information must be distributed on the consumer side (Engel, Kegerreis, and Blackwell, 1969; Katz, and Lazarsfeld, 1955; Mahajan, Muller, and Kerin, 1984). Particularly in experience goods like music, WOM has been tagged as the most crucial element of long-term success and is of minimal cost (De Vany, and Walls, 1999; Tirunillai, and Tellis, 2012).

Electronic Word-Of-Mouth (eWOM) has long been considered an influential marketing instrument (Bickart, and Schindler, 2001; Kumar, and Benbasat, 2006; Zhang, Craciun, and Shin, 2010). Consumers search for information posted by previous customers in order to make themselves comfortable before purchasing products or services (Pitta, and Fowler, 2005). The Internet has provided several appropriate platforms for eWOM, such as blogs, discussion forums, review websites, shopping websites and, lastly, social media websites (Cheung, and Thadani, 2012). Previous studies have found the influence of eWOM via these sources on the purchasing intentions of consumers (Bickart, and Schindler, 2001; Chan, and Ngai, 2011; Park, Lee, and Han, 2007; See-To, and Ho, 2014).

People are now able to exchange opinions and experiences about products or services with their friends and acquaintances on social media (Chu, and Kim, 2011; Kozinets, de Valck, Wojnicki, and Wilner, 2010). This reduced anonymity has the potential to make eWOM information more trustworthy and reliable (Chu, and Choi, 2011; Wallace, Walker, Lopez, and Jones, 2009). Indeed, since conversations in social media frequently refer to brands (Wolny, and Mueller, 2013), they are naturally influential on the purchasing intentions of consumers (Wang, Yu, and Wei, 2012). However, it is difficult to envisage all eWOM information as being influential on these intentions. Owing to the vast amount of information which consumers are exposed to, they need to critique and screen the information before using it.

The effects of electronic Word-Of-Mouth (eWOM) in virtual brand communities may also be significant (De Valck et al., 2009), as recommendations can occur at virtually no cost and spread rapidly, both within and beyond the virtual brand community. Chatterjee's (2001) findings support the applicability of specific WOM dynamics of traditional, offline contexts in online environments. For instance, consumers are more likely to search for, and accept,

especially negative eWOM when they lack information and experience (Richins, and Bloch, 1991). Chevalier and Mayzlin (2006) also report that the number of readers of online book reviews may affect book sales, with negative reviews having a larger detrimental effect on sales than positive reviews. However, since positive eWOM is an important determinant of purchase intention (Farzin, and Fattahi, 2018), examining the triggers of positive eWOM calls for focused attention on more research.

Online channels now allow people to widely share their opinions and experiences on products through self-created content, with full geographical and temporal freedom (Jansen et al., 2009). Different studies have dealt with the motivations behind user contributions and have linked them to the wish to enhance influence and status, as well as the intention to help other members of a community by offering meaningful input (Hennig-Thurau et al., 2004). Research has further shown the tremendous influence of user-generated content (UGC) on consumer decision-making. Findings provide evidence that consumers tend to prefer product reviews from peers compared to reviews from professionals (Dellarocas, Zhang, and Awad, 2007; Smith, Menon, and Sivakumar, 2005).

Numerous studies have investigated the impact of eWOM on product sales in various contexts. Most of the current studies have examined the triggers to use eWOM in social media, either conceptually (Sijoria et al., 2018, 2019) or by using consumer surveys and opinions (Sijoria et al., 2019). Preliminary focus has been placed on assessing the effects of volume, valence and dispersion of UGC on consumer decisions. The volume describes the amount of generated content, whereas valence deals with the sentiment of this content (positive or negative). Dispersion is related to the variance across all generated content regarding a specific product/topic. Findings in the movie industry seem to be contradictory, where some studies find valence to be the most influential driver for the success of a movie instead of volume when focusing on the sequential product rollout typical for the entertainment industry (Chintagunta, Gopinath, and Venkataraman, 2010). The positive correlation between user and critic ratings is also rather low, encouraging the intention to investigate the impact of user-generated opinions instead of those by professionals (Dellarocas et al., 2007). Previous studies in the creative industry point towards a positive effect of the volume of eWOM on product sales (Duan, Gu, and Whinston, 2008; Yong, 2006). The increase of awareness through the high presence of a topic in online media positively affects sales. This relationship has been mostly addressed by looking at the volume of reviews about a product. Some recent studies limit this positive effect of eWOM volume, claiming there is no significant relationship or sales do explain volume and not the other way round (Jungho, and Byung-Do, 2013; Roschk, and Große, 2013). These studies suggest that volume can only influence the success of niche items, for which there is a higher need to create awareness, and this effect is only present in the first week after the release of a movie.

2.4. The role of user engagement in eWoM

Consumer engagement with eWOM communication refers to customer behaviours that "go beyond transactions and may be specifically defined as a customer's behavioural manifestations that have a brand or firm focus, beyond purchase, resulting from motivational drivers" (Van Doorn et al., 2010, p. 254). This encompasses participation in eWOM-related activities, including initiating and sharing brand reviews, recommendations and referrals (Van Doorn et al., 2010). Such activities are derived through consumers' co-creation of value to self and others and inspire consumer experience (Brodie et al., 2011; Liou et al., 2016). This experience positively affects user engagement with eWoM, with its effects differentiating across communities for products and services and across their influence on 'likes' and 'comments' (Rossmann, Ranjan, Sugathan, 2016).

Taking an integrative approach, engagement was recently proposed to encompass various positively-valenced interactions between consumers and brands on three dimensions: cognitive, emotional and behavioural (Hollebeek, Glynn, and Brodie, 2014). The cognitive dimension refers to the level of brand-related thought processing and elaboration in a consumer/brand interaction. The emotional dimension relates to the extent of a desirable brand-related effect in a consumer/brand interaction. The behavioural brand engagement dimension accounts for the consumer activation process and refers to the time spent and effort invested by consumers during their brand-related activities (Hollebeek et al., 2014). In regard to digital social media, the behavioural dimension of consumer engagement with eWOM is of special interest, because SNS facilitates immediate and virtually costless engagement activities. Consumer engagement with eWOM on social media entails social interaction through receiving, commenting, liking or passing along product-related information to their social connections (Interactive Advertising Bureau, 2009). This often involves the consumer action of sharing experiences with others. This may result in a significant social benefit to consumers – the reinforcement of social relationships (Van Doorn et al., 2010). In general, it is hypothesised that content that creates user interaction, such as likes and shares, leads to eWOM. Each user, due to these actions, spreads his or her state to their network of friends and contacts.

2.5. The effect of eWoM on performance

As a rule, there is a push relation between positive comments, credibility and purchase intentions. A positive comment has a positive impact on credibility and influences purchase intention (Chih et al., 2013). The customers' positive eWOM is relevant to their brand purchases observed through sales performance (e.g. Babić et al., 2016; East et al., 2008; Pescher, Reichhart, and Spann, 2014). Similarly, the customers' negative eWOM is relevant to their retention performance, such as service disconnections (e.g. Vázquez-Casielles, Suárez-Álvarez, and del Río-Lanza, 2013). Xue and Phelps (2004) found that the eWOM platform to which a review is posted (an independent online forum versus a corporate website), by itself,

did not influence brand attitudes. In the current study, it is hypothesised that content shared from users (eWOM) increases the number of posts views, as well as the number of subscribers, due to new visits. Finally, the eWOM could potentially enhance the income from advertisement due to the increasing of advertisement views (impressions).

3. Method

The data was obtained by using the insights of a YouTube music channel and represents actual inputs from user interaction. All insights were selected from a 6-year period. During this time, almost 500 music videos were uploaded. The channel administrators provided all the necessary authorisation to use the current data set.

3.1. The channel

Data was obtained from a YouTube channel specialising in electronic music, featuring songs from producers from all over the world, but mainly from South Africa. It began activity in 2011 and, at the time of writing, has uploaded more than 3 000 videos with more than 190 000 subscribers and 125 000 000 views.

3.2. Procedure and Data set

After receiving the appropriate authorisation from channel's administrators, an Excel file containing the raw data from the channel's insights was delivered to the researchers. The data set was cleaned of any unnecessary variables. The new data set consisted of the following variables: Views, Ad Impressions (as shown by the YouTube algorithm), Likes, Shares, Comments and Subscribers. Comments and Likes were considered as User Engagement variables, while Shares represented the eWoM variable. For the needs of the study, the data set with inputs from 242 (N = 242) different country cases was selected. In total, 83 831 subscribers were included in the data. The final data set was then extracted into an SPSS statistics package.

4. Results

Simple linear regression analysis was conducted to predict (H1) the variability of electronic WoM based on the contribution of user engagement. Multiple regression analysis was conducted to examine (H2) the variability of several subscribers and video views based on the contribution of eWoM. Finally, linear regression analysis with the mediation effect was conducted to examine (H3) the variability of Advertisements Impressions based on the

contribution of user engagement by examining the mediation effect of eWoM. Regression analyses where obtained as the more appropriate to assess any significant prediction of the dependent variables (eWOM and performance metrics) from the independent ones (User Engagement and eWOM), as well as exploring the mediating prediction effect of eWOM.

Table 1.
Means and standard deviations

Variables	Mean	Standard deviation
User Engagement – Comments	187.44	994.933
User Engagement – Likes	1 582.94	6 565.326
eWOM – Shares	1 751.06	8 126.231
Views	268 203.67	1 343 794.744
Subscribers	346.41	1 355.046
Ad Impressions	70 368.60	694 727.402

Linear regression analysis was used to test if user engagement elements significantly predicted eWoM based on video shares. The results of the regression indicated that the two predictors explained 92.2% of the variance ($R^2 = 0.92$, $F(2, 24) = 1 412.5$, $p < 0.001$). It was found that number of comments significantly predicted eWOM ($\beta = 0.25$, $p < 0.001$), as did the number of likes ($\beta = 0.72$, $p < 0.001$) (Table 2).

Table 2.
Regression Coefficients 1

Predictors	Beta	Std. Error	t	Sig.	Correlations Zero-order	Partial	Part
Comments	0.252	0.491	4.188	0.000	0.936	0.261	0.076
Likes	0.717	0.074	11.915	0.000	0.957	0.610	0.215
Dependent Variable: Shares.							

Multivariate regression analysis was used to test if eWoM based on video shares, significantly predicted number of subscribers and video views. The results of the analysis reported that the independent variable explained 79.3% of the variance of Subscribers ($R^2 = .79$, $F(1, 24) = 924.2$, $p < .001$) and 70.4% of the variance of video views ($R^2 = .70$, $F(1, 24) = 573.6$, $p < .001$). It was indicated that eWoM significantly predicted Subscribers ($\beta = .89$, $p < .001$), and video views ($\beta = 0.84$, $p < .001$) (Table 3).

Table 3.
Regression Coefficients 2

Dependent variables	Beta	Std. Error	t	Sig.	Correlations		
					Zero-order	Partial	Part
Views	0.840	5.798	4.188	0.000	0.936	0.261	0.076
Subscribers	0.891	0.005	30.400	0.000	0.891	0.891	0.891
Predictor: Shares.							

Finally, the mediating role of eWoM in the relationship between User Engagement and Advertisements Impressions was examined. Likes and Comments as independent variables were examined separately into two different tests. After completion of the Sobel tests, it resulted that eWOM does not play a significant mediating role in the Likes-Advertisement impressions relationship ($z = 1.19$, $p > 0.05$). On the other hand, the results indicated that eWoM has a strong effect as a mediator in the Comments-Advertisement Impressions relationship ($z = 3.96$, $p < 0.001$).

5. Conclusion

The current study tries to offer a more thorough view of the effect that eWOM and engagement have on the crucial variables of a social media brand. This is achieved by using an extensive dataset provided by the YouTube API of a channel with almost 200 000 subscribers, more than 2 000 videos and 6 years of operation. In contrast with other similar papers, the data set has been extracted from social media channel insights and represents actual values.

It has been considered that the objective of a YouTube channel is to generate more views that, in return, generate more advertisements, which provide the channel owner more income. In order to achieve this, a populated community must be developed, leading to the increase of eWOM and, with a larger user, engagement (Frick, Tsekauras, and Li, 2014). This simple conceptual model has been tested through a statistical analysis of the dataset, leading to the confirmation of our hypotheses.

Statistical analyses showed that user engagement elements significantly predicted eWOM, which represents the number of shares. The role of eWOM as a predictor of important outcomes – such as number of subscribers and video views – has also been examined. It has been found that eWOM explained a vast amount of both variables. Finally, the significant mediating role of WOM in the relationship between User Engagement and Advertisements Impressions has been reported.

The results are in line with literature that states that what consumers talk about can be a good proxy for their preferences and hence a predictor of important performance variables such as sales (Asur, and Huberman, 2010; Kumar, Bhaskaran, Mirchandani, and Shah, 2013;

Sonnier et al., 2011). Many researchers showed that spreading WOM (Kumar et al., 2013), positive and neutral comments (Sonnier et al., 2011) and the volume of content about a brand (Asur, and Huberman, 2010) enhance the sales and performance of a brand. Consumer involvement with brand-related user-generated content enhances brand equity (Christodoulides, Jevons, and Bonhomme, 2012), and involvement in co-creation of value enhances the transfer of WOM and purchase intentions (See-To, and Ho, 2014). Finally, the current research outcomes support the findings of Rossmann et al. (2016), who reported that user engagement has a positive effect on eWOM for various brands.

6. Managerial implications

The results of the current study are highly important for companies or artists in the field of social media promotion, as they provide the interested parties with enough information on how to develop their promotion strategy and how to best manage the content they want to upload. Videos (or content in general) should create the need for the user (or client) to interact with the content or post. This leads to a larger number of likes, shares and comments, and then to an augmented number of views and thus advertisements.

7. Future Research

The results of the current study should not be generalised, as they represent insights only from a specific music YouTube channel. Users could possibly engage and interact in a different way through other social media platforms (such as Facebook or Instagram). The research on the subject could be expanded by analysing the effect that sponsored posts have on the content. This would enhance the ability to understand how paid promotion works on social media and would provide a better understanding on how the advertiser could meet the KPIs set. Furthermore, another point of interest could be an examination of the relationship between two social media platforms. Do the social media communities of the same brand interact with each other, and what is their correlation? With the rise and fall of various social media platforms, it is difficult for a brand to maintain its interest in all their platforms, so there should be a more insightful approach on brand community management.

References

1. Algesheimer, R., and Wangenheim, F.V. (2006). A network based approach to customer equity management. *Journal of Relationship Marketing, 5(1),* 39-57. doi: https://doi.org/10.1300/J366v05n01_04.

2. Algesheimer, R., Dholakia, U.M., and Herrmann, A. (2005). The social influence of brand community: Evidence from European car clubs. *Journal of marketing, 69(3),* 19-34. doi: 10.1300/J366v05n01_04.

3. Asur, S., and Huberman, B.A. (2010, August). Predicting the future with social media. Proceedings of the 2010 IEEE/WIC/ACM International Conference on Web Intelligence and Intelligent Agent Technology-Volume 01. *IEEE Computer Society,* (pp. 492-499). doi: 10.1109/WI-IAT.2010.63.

4. Babić Rosario, A., Sotgiu, F., De Valck, K., and Bijmolt, T. H. (2016). The effect of electronic word of mouth on sales: A meta-analytic review of platform, product, and metric factors. *Journal of Marketing Research, 53(3),* 297-318. doi: 10.1509/jmr.14.0380.

5. Berger, J., and Milkman, K.L. (2012). What makes online content viral? *Journal of marketing research, 49(2),* 192-205. doi: 10.1509%2Fjmr.10.0353.

6. Bickart, B., and Schindler, R.M. (2001). Internet forums as influential sources of consumer information. *Journal of interactive marketing, 15(3),* 31-40. doi: 10.1002/dir.1014.

7. Brodie, R.J., Hollebeek, L.D., Jurić, B., and Ilić, A. (2011). Customer engagement: Conceptual domain, fundamental propositions, and implications for research. *Journal of service research, 14(3),* 252-271. doi: 10.1177%2F1094670511411703.

8. Chan, Y.Y., and Ngai, E.W. (2011). Conceptualising electronic word of mouth activity: An input-process-output perspective. *Marketing Intelligence and Planning, 29(5),* 488-516. doi: 10.1108/02634501111153692.

9. Chatterjee, P. (2001) Online Reviews: Do Consumers Use Them? *Advances in Consumer Research*, *28,* 129-133.

10. Chen, A., Lu, Y., Wang, B., Zhao, L., and Li, M. (2013). What drives content creation behavior on SNSs? A commitment perspective. *Journal of Business Research, 66(12),* 2529-2535. doi: 10.1016/j.jbusres.2013.05.045.

11. Cheung, C.M., and Thadani, D.R. (2012). The impact of electronic word-of-mouth communication: A literature analysis and integrative model. *Decision support systems, 54(1),* 461-470. doi:10.1016/j.dss.2012.06.008.

12. Cheung, C.M., Chiu, P.Y., and Lee, M.K. (2011). Online social networks: Why do students use facebook? *Computers in Human Behavior, 27(4),* 1337-1343. doi: 10.1016/j.chb.2010.07.028.

13. Chevalier, J.A., and Mayzlin, D. (2006). The effect of word of mouth on sales: Online book reviews. *Journal of marketing research, 43(3),* 345-354. doi: 10.1509%2Fjmkr.43.3.345.

14. Chih, W.H., Wang, K.Y., Hsu, L.C., and Huang, S.C. (2013). Investigating electronic word-of-mouth effects on online discussion forums: the role of perceived positive electronic word-of-mouth review credibility. *Cyberpsychology, Behavior, and Social Networking, 16(9),* 658-668. doi: 10.1089/cyber.2012.0364.

15. Chintagunta, P.K., Gopinath, S., and Venkataraman, S. (2010). The effects of online user reviews on movie box office performance: Accounting for sequential rollout and aggregation across local markets. *Marketing Science, 29(5),* 944-957. doi:10.1287/mksc.1100.0572.

16. Choi, Y.H., and Bazarova, N.N. (2015). Self-disclosure characteristics and motivations in social media: Extending the functional model to multiple social network sites. *Human Communication Research, 41(4),* 480-500. doi: 10.1111/hcre.12053.

17. Christodoulides, G., Jevons, C., and Bonhomme, J. (2012). Memo to marketers: Quantitative evidence for change: How user-generated content really affects brands. *Journal of advertising research, 52(1),* 53-64. doi: 10.2501/JAR-52-1-053-064.

18. Chu, S.C., and Choi, S.M. (2011). Electronic word-of-mouth in social networking sites: A cross-cultural study of the United States and China. *Journal of Global Marketing, 24(3),* 263-281. doi: 10.1080/08911762.2011.592461.

19. Chu, S.C., and Kim, Y. (2011). Determinants of consumer engagement in electronic word-of-mouth (eWOM) in social networking sites. *International Journal of Advertising, 30(1),* 47-75. doi: 10.2501/IJA-30-1-047-075.

20. De Valck, K., Van Bruggen, G.H., and Wierenga, B. (2009). Virtual communities: A marketing perspective. *Decision support systems, 47(3),* 185-203. doi: 10.1016/j.dss.2009.02.008.

21. De Vany, A., and Walls, W.D. (1999). Uncertainty in the movie industry: Does star power reduce the terror of the box office? *Journal of cultural economics, 23(4),* 285-318. doi: 10.1023/A:1007608125988.

22. Dellarocas, C. (2003). The digitization of word of mouth: promise and challenges of online feedback mechanisms. *Management Science, 49(10),* 1407-1424. doi: 10.1287/mnsc.49.10.1407.17308.

23. Dellarocas, C., Zhang, X.M., and Awad, N.F. (2007). Exploring the value of online product reviews in forecasting sales: The case of motion pictures. *Journal of Interactive Marketing, 21(4),* 23-45. doi:10.1002/dir.20087.

24. Duan, W., Gu, B., and Whinston, A.B. (2008). Do online reviews matter? An empirical investigation of panel data. *Decision support systems, 45(4),* 1007-1016. doi: 10.1016/j.dss.2008.04.001.

25. Dwyer, P. (2007). Measuring the value of electronic word of mouth and its impact in consumer communities. *Journal of Interactive Marketing, 21(2),* 63-79. doi: 10.1016/j.ijresmar.2008.04.001.

26. East, R., Hammond, K., and Lomax, W. (2008). Measuring the impact of positive and negative word of mouth on brand purchase probability. *International journal of research in marketing, 25(3),* 215-224. doi: 10.1016/j.ijresmar.2008.04.001.

27. Ellis-Chadwick, F., and Chaffey, D. (2012). *Digital Marketing: Strategy, Implementation and Practice.* Pearson.

28. Ellison, N.B., Steinfield, C., and Lampe, C. (2007). The benefits of Facebook "friends:" Social capital and college students' use of online social network sites. *Journal of computer-mediated communication, 12(4),* 1143-1168. doi: 10.1111/j.1083-6101.2007.00367.x.

29. Engel, J.F., Kegerreis, R.J., and Blackwell, R.D. (1969). Word-of-mouth communication by the innovator. *Journal of Marketing, 33(3),* 15-19. doi: 10.1177%2F00222429 6903300303.

30. Farzin, M., and Fattahi, M. (2018). eWOM through social networking sites and impact on purchase intention and brand image in Iran. *Journal of Advances in Management Research, 15(2),* 541-553. doi: 10.1108/JAMR-05-2017-0062.

31. Fournier, S., and Avery, J. (2011). The uninvited brand. *Business horizons, 54(3),* 193-207. doi: 10.1016/j.bushor.2011.01.001.

32. Frick, T., Tsekauras, D., and Li, T. (2014). The times they are a-changin: Examining the impact of social media on music album sales and piracy. *In Annual Meeting of the Academy of Management, Philadelphia, PA.* doi: 10.5465/ambpp.2014.16984abstract.

33. Grégoire, Y., Laufer, D., and Tripp, T.M. (2010). A comprehensive model of customer direct and indirect revenge: Understanding the effects of perceived greed and customer power. *Journal of the Academy of Marketing Science, 38(6),* 738-758. doi: 10.1007/s11747-009-0186-5.

34. Grieve, R., Indian, M., Witteveen, K., Tolan, G.A., and Marrington, J. (2013). Face-to-face or Facebook: Can social connectedness be derived online? *Computers in human behavior, 29(3),* 604-609. doi: 10.1016/j.chb.2012.11.017.

35. Hennig-Thurau, T., Gwinner, K.P., Walsh, G., and Gremler, D.D. (2004). Electronic word-of-mouth via consumer-opinion platforms: what motivates consumers to articulate themselves on the internet*?. Journal of interactive marketing, 18(1),* 38-52. doi: 10.1002/dir.10073.

36. Hennig-Thurau, T., Hofacker, C.F., and Bloching, B. (2013). Marketing the pinball way: understanding how social media change the generation of value for consumers and companies. *Journal of Interactive Marketing, 27(4),* 237-241. doi: 10.1016/j.intmar.2013.09.005.

37. Hoffman, D.L., and Fodor, M. (2010). Can you measure the ROI of your social media marketing? *MIT Sloan management review, 52(1),* 41.

38. Hollebeek, L.D., Glynn, M.S., and Brodie, R.J. (2014). Consumer brand engagement in social media: Conceptualization, scale development and validation. *Journal of interactive marketing, 28(2),* 149-165. doi:10.1016/j.intmar.2013.12.002.

39. Jansen, B.J., Zhang, M., Sobel, K., and Chowdury, A. (2009). Twitter power: Tweets as electronic word of mouth. *Journal of the American society for information science and technology, 60(11),* 2169-2188. doi: 10.1002/asi.21149.

40. Katz, E., Lazarsfeld, P.F., and Roper, E. (2017). Personal influence: *The part played by people in the flow of mass communications.* Routledge. doi: 10.4324/9781315126234.

41. Kozinets, R.V., De Valck, K., Wojnicki, A.C., and Wilner, S.J. (2010). Networked narratives: Understanding word-of-mouth marketing in online communities. *Journal of Marketing, 74(2),* 71-89. doi: 10.1509%2Fjm.74.2.71.

42. Ksiazek, T.B., Peer, L., and Lessard, K. (2016). User engagement with online news: Conceptualizing interactivity and exploring the relationship between online news videos and user comments. *New Media & Society*, *18(3),* 502-520. doi: 10.1177/ 1461444814545073.

43. Kumar, N., and Benbasat, I. (2006). Research note: the influence of recommendations and consumer reviews on evaluations of websites. *Information Systems Research, 17(4),* 425-439. doi: 10.1287/isre.1060.0107.

44. Kumar, V., Bhaskaran, V., Mirchandani, R., and Shah, M. (2013). Practice prize winner— creating a measurable social media marketing strategy: increasing the value and ROI of intangibles and tangibles for hokey pokey. *Marketing Science, 32(2),* 194-212. doi: 10.1287/mksc.1120.0768.

45. Kwon, O., and Wen, Y. (2010). An empirical study of the factors affecting social network service use. *Computers in human behavior,* 26(2), 254-263. doi: 10.1016/j.chb. 2009.04.011.

46. Li, T., Berens, G., and de Maertelaere, M. (2013). Corporate Twitter channels: The impact of engagement and informedness on corporate reputation. *International Journal of Electronic Commerce, 18(2),* 97-126. doi:10.2753/JEC1086-4415180204.

47. Liou, D.K., Chih, W.H., Yuan, C.Y., and Lin, C.Y. (2016). The study of the antecedents of knowledge sharing behavior: The empirical study of Yambol online test community. *Internet Research, 26(4),* 845-868. doi: 10.1108/IntR-10-2014-0256.

48. Liu, Y. (2006). Word of mouth for movies: Its dynamics and impact on box office revenue. *Journal of Marketing, 70(3),* 74-89. doi:10.1509%2Fjmkg.70.3.074.

49. Mahajan, V., Muller, E., and Kerin, R.A. (1984). Introduction strategy for new products with positive and negative word-of-mouth. *Management Science, 30(12),* 1389-1404. doi: 10.1287/mnsc.30.12.1389.

50. Malthouse, E.C., Haenlein, M., Skiera, B., Wege, E., and Zhang, M. (2013). Managing customer relationships in the social media era: Introducing the social CRM house. *Journal of Interactive Marketing, 27(4),* 270-280. doi: 10.1016/j.intmar.2013.09.008.

51. Mishra, A.S. (2019). Antecedents of consumers' engagement with brand-related content on social media. *Marketing Intelligence & Planning*, *37(4)*, 386-400. doi:10.1108/MIP-04-2018-0130.

52. Mollen, A., and Wilson, H. (2010). Engagement, telepresence and interactivity in online consumer experience: Reconciling scholastic and managerial perspectives. *Journal of business research, 63(9-10),* 919-925. doi: 10.1016/j.jbusres.2009.05.014.

53. Mowen, J.C., Park, S., and Zablah, A. (2007). Toward a theory of motivation and personality with application to word-of-mouth communications. *Journal of business research, 60(6),* 590-596. doi: 10.1016/j.jbusres.2006.06.007.

54. Muniz, A.M., and O'guinn, T.C. (2001). Brand community. *Journal of consumer research, 27(4),* 412-432. doi:10.1086/319618.

55. Nisar, T.M., Prabhakar, G., Ilavarasan, P.V. and Baabdullah, A.M. (2019). Up the ante: electronic word of mouth and its effects on firm reputation and performance. *Journal of Retailing and Consumer Services, 53.* doi.org:10.1016/j.jretconser.2018.12.010.

56. Park, D.H., Lee, J., and Han, I. (2007). The effect of on-line consumer reviews on consumer purchasing intention: The moderating role of involvement. *International journal of electronic commerce, 11(4),* 125-148. doi: 10.2753/JEC1086-4415110405.

57. Pescher, C., Reichhart, P., and Spann, M. (2014). Consumer decision-making processes in mobile viral marketing campaigns. *Journal of interactive marketing, 28(1),* 43-54. doi: 10.1016/j.intmar.2013.08.001.

58. Pitta, D.A., and Fowler, D. (2005). Internet community forums: an untapped resource for consumer marketers. *Journal of Consumer Marketing, 22(5),* 265-274. doi: 10.1108/ 073637605110611699.

59. Richins, M.L., and Bloch, P.H. (1991). Post-purchase product satisfaction: Incorporating the effects of involvement and time. *Journal of Business Research, 23(2),* 145-158. doi: 10.1016/0148-2963(91)90025-S.

60. Roschk, H., and Grosse, S. (2013). Talking about films: Word-of-mouth behavior and the network of success determinants of motion pictures. *Journal of Promotion Management, 19(3),* 299-316. doi: 10.1080/10496491.2013.770810.

61. Rossmann, A., Ranjan, K.R., and Sugathan, P. (2016). Drivers of user engagement in eWoM communication. *Journal of Services Marketing, 30(5),* 541-553. doi:10.1108/JSM-01-2015-0013.

62. Ryan, D. (2016). *Understanding digital marketing: marketing strategies for engaging the digital generation.* Kogan Page Publishers.

63. See-To, E.W., and Ho, K.K. (2014). Value co-creation and purchase intention in social network sites: The role of electronic Word-of-Mouth and trust–A theoretical analysis. *Computers in Human Behavior, 31,* 182-189. doi: 10.1016/j.chb.2013.10.013.

64. Sijoria, C., Mukherjee, S., and Datta, B. (2018). Impact of the antecedents of eWOM on CBBE. *Marketing Intelligence & Planning, 36(5),* 528-542. doi:10.1108/MIP-10-2017-0221.

65. Sijoria, C., Mukherjee, S., and Datta, B. (2019). Impact of the antecedents of electronic word of mouth on consumer based brand equity: a study on the hotel industry. *Journal of Hospitality Marketing & Management, 28(1),* 1-27. doi:10.1080/19368623.2018.1497564.

66. Smith, D., Menon, S., and Sivakumar, K. (2005). Online peer and editorial recommendations, trust, and choice in virtual markets. *Journal of interactive marketing, 19(3),* 15-37. doi: 10.1002/dir.20041.

67. Sonnier, G.P., McAlister, L., and Rutz, O.J. (2011). A dynamic model of the effect of online communications on firm sales. *Marketing Science, 30(4),* 702-716. doi: 10.1287/mksc.1110.0642.

68. Spaulding, T.J. (2010). How can virtual communities create value for business*? Electronic Commerce Research and Applications*, *9,* 38-49. doi:10.1016/j.elerap.2009.07.004.

69. Thompson, S.A., and Sinha, R.K. (2008). Brand communities and new product adoption: The influence and limits of oppositional loyalty. *Journal of marketing, 72(6),* 65-80. doi:10.1509%2Fjmkg.72.6.065.

70. Tirunillai, S., and Tellis, G.J. (2012). Does chatter really matter? Dynamics of user-generated content and stock performance. *Marketing Science, 31(2),* 198-215. doi:10.1287/mksc.1110.0682.

71. Van Doorn, J., Lemon, K.N., Mittal, V., Nass, S., Pick, D., Pirner, P., and Verhoef, P.C. (2010). Customer engagement behavior: Theoretical foundations and research directions. *Journal of service research, 13(3),* 253-266. doi: 10.1177%2F1094670510375599.

72. Vázquez-Casielles, R., Suárez-Álvarez, L., and Del Rio-Lanza, A.B. (2013). The word of mouth dynamic: How positive (and negative) WOM drives purchase probability: An analysis of interpersonal and non-interpersonal factors. *Journal of Advertising Research, 53(1),* 43-60. doi: 10.2501/JAR-53-1-043-060.

73. Wallace, D., Walker, J., Lopez, T., and Jones, M. (2009). Do word of mouth and advertising messages on social networks influence the purchasing behavior of college students? *Journal of Applied Business Research, 25(1),* 101-9. doi:10.19030/jabr.v25i1.1052.

74. Wang, X., Yu, C., and Wei, Y. (2012). Social media peer communication and impacts on purchase intentions: A consumer socialization framework. *Journal of interactive marketing, 26(4),* 198-208. doi:10.1016/j.intmar.2011.11.004.

75. Wangenheim, F.V., and Bayón, T. (2007). The chain from customer satisfaction via word-of-mouth referrals to new customer acquisition. *Journal of the Academy of Marketing Science, 35(2),* 233-249. doi:10.1007/s11747-007-0037-1.

76. Wolny, J., and Mueller, C. (2013). Analysis of fashion consumers' motives to engage in electronic word-of-mouth communication through social media platforms. *Journal of Marketing Management, 29(5-6),* 562-583. doi: 10.1080/0267257X.2013.778324.

77. Xue, F., and Phelps, J.E. (2004). Internet-facilitated consumer-to-consumer communication: The moderating role of receiver characteristics. *International journal of internet marketing and advertising, 1(2),* 121-136. doi: 10.1504/IJIMA.2004.004016.

78. Yoon, G., Li, C., Ji, Y., North, M., Hong, C., and Liu, J. (2018). Attracting Comments: Digital Engagement Metrics on Facebook and Financial Performance. *Journal of Advertising, 47(1),* 24-37. doi: 10.1080/00913367.2017.1405753.

79. Zhang, J.Q., Craciun, G., and Shin, D. (2010). When does electronic word-of-mouth matter? A study of consumer product reviews. *Journal of Business Research, 63(12),* 1336-1341. doi: 10.1016/j.jbusres.2009.12.011.

EFFECTIVENESS OF A NATIONAL RESOURCE FUND IN COUNTERACTING THE RESOURCE CURSE

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Abstract: The objective of this article is to identify indicators that allow for assessing the effectiveness of resource funds in the context of the resource curse occurrence in countries rich in natural resources. At particular stages of the study, several research tasks were also carried out, which made it possible to achieve the goal – the concept of the resource fund was conceptualised, the types and functions of the fund were presented, the individual objectives of creating funds were assigned to the symptoms of the resource curse, the concept of the resource fund was referred to the sovereign wealth funds, and a system resource fund operates was also introduces.

Keywords: resource fund, resource curse, economic development, resource rich countries, Sovereign Wealth Fund.

1. Introduction

The development issues of countries rich in natural resources[1] are important and actual, because many wealthy economies struggle with a resource curse[2]. The paradox of plenty is a phenomenon of achieving worse results of economic development by countries specialising in the extraction and export of natural resources compared to countries whose resources are negligible, which commonly occurs (i.a. Auty, 2001; Sachs, and Warner, 2001; Neumayer, 2004; Bulte et al., 2005; Arezki, and van der Ploeg, 2007; Dymitrowska, 2015). In recent years, due to the fall and volatility of prices of strategically important natural resources, such as oil and natural gas, the problem is becoming more and more serious. The resource curse is not

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[1] In this study, a country rich in natural resources is treated unambiguously with the concept of a country specialising in the extraction and export of natural resources and a country whose economy is based on the extraction and export of natural resources. At the same time, it is assumed that a country rich in natural resources is a country in which one of these conditions is met: the average annual revenues of the mining industry (in % of GDP) exceed 25%, or 25% of the average annual exports are natural resources. More on this subject in: Dymitrowska, 2015, p. 50.

[2] Other common nomenclature in literature – paradox of plenty, curse of natural resources, curse of wealth.

a law, but a strong tendency seen in many, but not all, countries exporting natural resources. Botswana, Chile, Indonesia, Malaysia, United Arab Emirates, Canada and Australia are mentioned in literature as countries that managed to avoid the curse (e.g. Auty, 1993; Sarraf, and Jiwanji, 2001; Acemoglu et al., 2001; Rasiah, and Shari, 2001; Fasano, 2002; Wright, and Czelusta, 2002; Larsen, 2005; Stevens, 2003a, 2003b; Stijns, 2005; Dymitrowska, 2015). Norway is the undisputed leader in the ranking of beneficiaries of abundance of natural resources. Based on an analysis of the economic policies used in these countries, some tools can be identified as important in counteracting the resource curse. One of the measures is the active policy of the National Resources Fund (NRF).

Many forms of funds have been created in recent years, and some countries have benefited significantly from their creation. An often-mentioned fund as an example of great success is the Government Pension Fund Global of Norway (i.a. Mikesell, 1997; Usui, 1997; Fasano, 2000; Frankel, 2010). At the same time, it should be noted that in many developing countries, natural resource funds have poor efficiency (e.g. Davis et al., 2001). Therefore, scientists' opinions on the importance of natural resource funds for the economic development of countries rich in natural resources are divided. Some researchers pay attention to the fact that the tasks carried out by the fund can be effectively performed through active state fiscal policy (e.g. Davis et al., 2001; Ossowski et al., 2008), and the resource fund, as one of the national stabilisation tools, is characterised by weak efficiency. Others (e.g. Devlin, and Lewen, 2002; Shabsigh, and Ilahi, 2007; Bagattini, 2011; Asik, 2017) see a positive relation between the activity of the NRF and counteracting the paradox of plenty. Still others question the possibility of using the tool effectively in those poorest countries rich in natural resources (e.g. Dymitrowska, 2015). There is also no unanimity as to the methodology for assessing the effectiveness of funds. Due to the use of different assessment criteria and divergent interpretations of the concept of the natural resource fund, the research results are ambiguous. In addition, it should be noted that the funds created in individual exporters of natural resources differ in terms of their functions, and the assumptions of the fund's activities change over time. There is no generally accepted rule regarding the method of creation and management of the NRF enabling its effective functioning. Therefore, a significant research gap is visible in the field of issues related to the national natural resource fund and assessment of the fund's effectiveness in counteracting the resource curse.

The main goal of this study is to distinguish indicators that allow for assessing the effectiveness of natural resource funds in the context of the resource curse in countries rich in natural resources. To achieve the goal, a number of research tasks have also been defined. These include: conceptualisation of the concept of an NRF, an indication of the types and functions of the fund, linking the individual tasks of the fund with signs of the resource curse, referring the concept of the NRF to sovereign wealth funds and presenting a system resource fund operates.

The article consists of three parts, preceded by an introduction, and is summarised by main conclusions. The initial part presents the essence of the natural resource fund in the context of the paradox of plenty. Critical analysis of current scientific achievements has allowed the author to organise issues related to the NRF. The concept of the fund was also conceptualised. The motives for creating the fund and its types were described. Additionally, a general scheme describing how the fund functions was proposed. The second part analyses various methodologies and research results regarding the assessment of the effectiveness of an NRF in countries rich in natural resources. The last part refers to individual functions of the resource fund to the symptoms of the resource curse and presents the author's list of indicators relevant for assessing the effectiveness of natural resource funds in relation to individual functions and the tasks performed by them.

The study is theoretical. To prepare the article, foreign literature in English was mostly used. Materials provided by international organisations (including the World Bank, International Monetary Fund, International Forum of Sovereign Wealth Funds, Natural Resource Governance Institute, International Forum of Sovereign Wealth Funds) were also used.

2. Essence of the National Resource Fund

One of the main reasons for the resource curse in countries rich in natural resources is the volatility of commodity prices. In a situation where a country's economy is heavily dependent on revenues from their exports of natural resources, any sharp change in the price on the international natural resources market causes a collapse on the domestic market. It is noteworthy that the rapid increase in commodity prices also negatively affects the economic situation of their exporting country, contributing to the emergence of a Dutch disease and resource curse in the long run[3].

The first NRFs[4] were created to stabilise the situation in a country rich in natural resources and to create a kind of buffer between changes on the global and domestic market. Therefore, in literature on the subject (Asik, 2017; Sugawara, 2017), the term stabilisation fund is often used to refer to the NRF. The stabilising function of the natural resource fund is implemented by setting a price limit for exported resources. If the price exceeds a certain threshold, the excess

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[3] Dutch disease is a phenomenon involving the reduction of competitiveness, both in the country and abroad (and ultimately bankruptcy), of domestic enterprises from sectors not related to the dynamically developing mining industry, leading to a *quasi*-recession and dependence of the country's economy on the production and export of natural resources (Corden and Neary, 1982). This is one of the main endogenous macroeconomic causes of the resource curse. A detailed mechanism of action of the Dutch disease and resource curse was presented, among others, in (Dymitrowska, 2015).

[4] The first natural resource fund was established in 1953 in Kuwait (Sugawara, 2014).

income is accumulated in the fund's account. If the price falls below the threshold, the deficit is financed from the fund. The optimal price of the resources is determined on the basis of an analysis of the situation on the international market and an assessment of the state budget demand (Stevens, 2003b) (Figure 1).
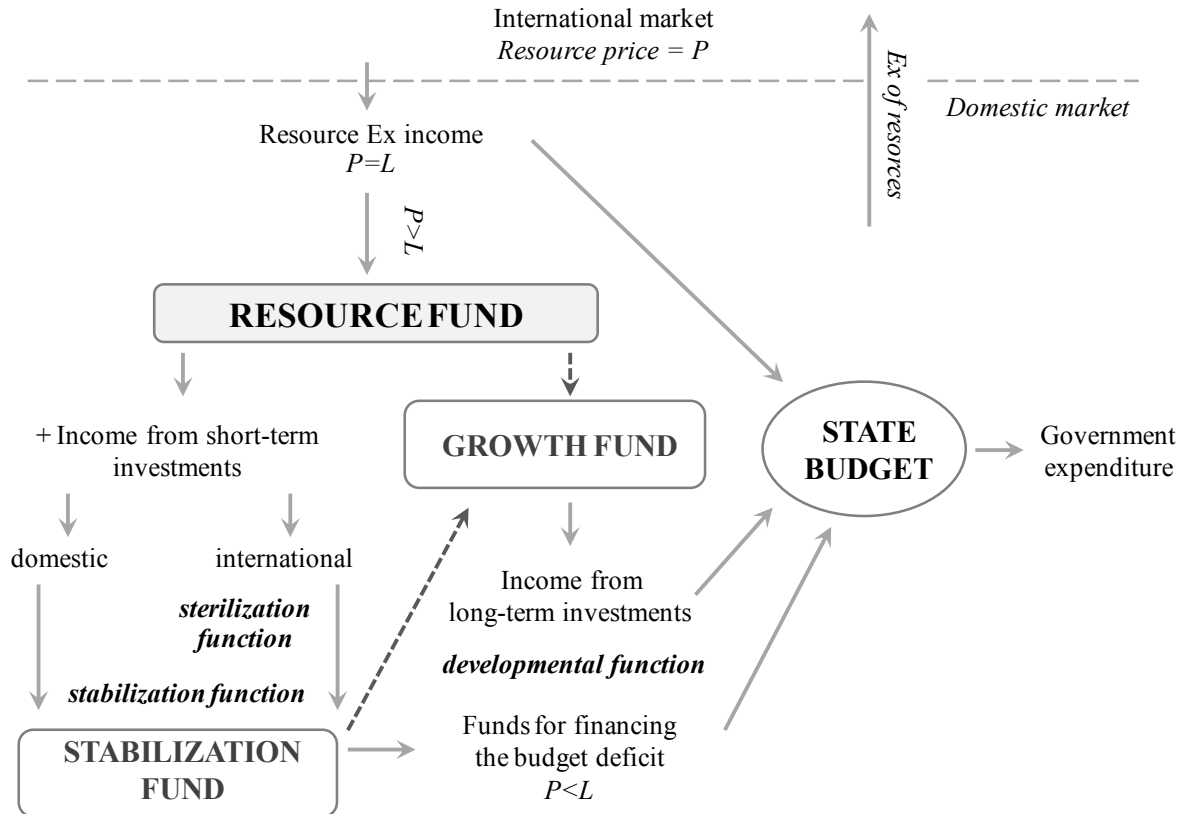
P - resource price on the international market
L - the price limit of the exported resources determined by the state at which the income from sales feeds the state budget
Ex - export
– – ➤ the growth fund may be part of the resource fund or a separate state body

Figure 1. Resource fund functioning system. Adapted from: own study.

Contemporary NRFs, however, do not have only a stabilising function. Over the years, many different forms of natural resource funds have been created. Analysing the total of funds created, two additional functions performed in the context of counteracting the resource curse can be distinguished. The first is the sterilisation function, which is directly related to the stabilising role of the NRF. The goal is to separate the national economy from the high surplus of revenues resulting from an increase in natural resource prices during a so-called natural resource boom. The funds accumulated in the fund are not invested in the domestic market but in the foreign market. Part of the money is allocated to the purchase of short-term securities (shares and bonds), whilst other funds are often invested in highly liquid assets. Part of the natural resource revenues is invested in the country in accordance with the principle described above regarding the case of the stabilisation fund. This manner of investing the accumulated resource revenues allows the fund to perform a sterilisation and stabilisation function at the

same time, as it guarantees the quick recovery of money in the event of a drop in the prices of natural resources and for covering the deficit created (Figure 1).

In recent years, among countries rich in natural resources, there is a trend to create a new form of the fund that has a development function (in other words, long-term saving or saving) (BRSP, 2006, p. 27). The so-called growth fund can only be part of the resource fund or constitute an independent state body. The development function consists in allocating part or all of the revenues from the sale of resources accumulated in the fund for long-term investments in diversified foreign assets so that both present and future generations can benefit from the national wealth (Figure 1). In the case of the growth fund and other forms of NRFs, it is recommended to spend the least amount of export revenues in the country. An extreme case is the allocation of only profits generated as a result of the fund's long-term investment activities to finance domestic investments. A radical form of the growth fund was used, for example, in Norway, where the Government Pension Fund Global is one of the most profitable and effective funds in the world. The long-term savings function, however, requires the formation of appropriate institutional, political and social conditions in the country. Social phenomena, such as a rent seeking, for example, often occurring in countries rich in natural resources, can be a significant obstacle to the fund's successful operation. In addition, the use of the Norwegian form of the fund in the poorest countries seems impossible. It is difficult to convince the citizens of a country that is lacking, for example, drinking water and food to set aside money earned on the sale of resources for future generations. Often, such countries are not prepared to create a fund due to the lack of an appropriate institutional framework and unstable political situation. However, it should be noted that the growth fund as an element of a policy of the national resource fund may constitute a so-called "window of opportunity", enabling diversification of the economy. Over time, the country may change its position on the international market from an exporter of natural resources to an exporter of financial capital. Reducing the level of dependence of economic development on the resource industry is one of the main tasks to counter the resource curse.

Table 1 presents examples of NRFs in accordance with their function/s.

From the information contained in Table 1, it follows that there is no one universal template for a resource fund. The common feature of an NRF is, however, the fact that the owner and entity managing the fund is the state, and the funds that are accumulated come from the sale of natural resources. This is why it is appropriate to use the term resource fund, which is a multi-faceted term that combines both the concept of a stabilisation fund (including a sterilisation function) and a growth fund. The term national resource fund is also appropriate due to the state form of the fund and the domestic nature of natural resources.

Table 1.
Examples of NRFs by function

Fund name		Country	Founded	Function		
				stabilisation	sterilisation	development (saving)
Alberta Heritage Savings Trust Fund		Alberta, Canada	1976			X
Copper Stabilisation Fund (1985)	*Pension Reserve Fund*	Chile	2006			X
	Economic and Social Stabilisation Fund		2006	X	X	
Government Pension Fund Global		Norway	1990			X
General Reserve Fund		Kuwait	1953	X	X	
Future Generations Fund			1976			X
Timor-Leste Petroleum Fund		Timor-Leste	2005	X	X	X
Alaska Permanent Fund		Alaska, USA	1976			X

Adapted from: own study based on "Our Members" by the International Forum of Sovereign Wealth Funds. Copyright 2019 by IFSWF.

Thus, the resource fund (also the national resource fund, NRF) is a state entity aimed at managing the revenues obtained from the export of natural resources so as to enable stable long-term economic development of the country exporting resources.

In summary, a general functional NRF system is proposed, as illustrated in Figure 1. The figure presents the mechanism of operation of the resource fund, taking into account all the functions that it can perform. The scheme will have a different form for each specific case study of a country rich in natural resources. However, the figure illustrates the general assumptions for the functioning of an NRF and can be used as a reference for further research.

Given the multidimensionality of the concept of a resource fund, the so-called Sovereign Wealth Fund (SWF) should be mentioned, whose activity in recent years has been the subject of interest of many scientists in the fields of economics and political science, as well as international organisations and wide public opinion. The Sovereign Wealth Fund is a governmental investment (or savings) fund created to manage (invest) foreign assets so as to make profits from the accumulated funds (Aizenman, and Glick, 2009; Sun, and Hesse, 2010; Sugawara, 2014). Otherwise, the SWF can be defined as investment entities established for the long-term investment of fixed budget surpluses, coming from the export of natural resources, fiscal revenues, revenues from privatisation, foreign exchange operations and a positive balance of payments in global financial assets (Wiśniewski, 2011). The International Monetary Fund distinguishes four types of SWFs: stabilisation funds, pension reserve funds, reserve investment funds and savings funds (IMF, 2012). Literature on the subject also includes other SWF divisions, for example into stabilisation and savings funds, investing foreign exchange, development and retirement (Marchewka-Bartkowiak, 2009). Considering the source of funds accumulated, it should be stated that the resource fund described above is a form of an SWF. Depending on the tasks set before the fund, it may then perform the function or functions of stabilisation, sterilisation or development (or savings). At the same time, it should be noted that

NRFs play a key role in Sovereign Wealth Funds, and their impact on the global financial market is significant (Urban, 2017). According to data from the Sovereign Wealth Fund Institute, the total assets of all SWFs in the world are approx. USD 7.912 billion, of which over half are NRFs (SWFI, 2019).

3. The issue of assessing the effectiveness of NRFs in literature

Due to the significant impact of SWFs, in particular resource funds, on global financial markets and because of their growing importance in the global economy, Sovereign Wealth Funds are the subject of interest of many scientists (e.g. Devlin, and Lewin, 2005; Aizenman, and Glick, 2009; Marchewka-Bartkowiak, 2009; Sun, and Hesse, 2010; Bagattini, 2011; Balding, 2012; Barma, 2012; Sugawara, 2014; Asik, 2017; Urban, 2017). Part of the research was focused on analysing the effectiveness of NRFs in the category of counteracting the resource curse (including Fasano, 2000; Devlin, and Titman, 2004; Devlin, and Lewin, 2005; Shabsigh, and Ilahi, 2007; Ossowski et al., 2008; Barma et al., 2012; Sugawara, 2014; Dymitrowska, 2015; Asik, 2017).

In most of the work devoted to NRF issues, the effectiveness of the fund's stabilisation function is primarily examined. The methodology adopted in individual studies is varied, which affects the differences in the results presented. Some studies focused on case studies of individual countries, while others used data from a number of resource-rich countries. For example, Fasano (2000) analysed six rich regions (Norway, Chile, Venezuela, Kuwait, Oman and Alaska (USA)), assessing the effectiveness of NRFs based on an analysis of the effectiveness of the isolation of domestic expenditure from export revenues of natural resources. It was found that the results differ depending on the specific case of the country, the adopted principles of the fund's operation and the quality of the NRF policy. The importance of the resource fund as a means of stabilising government spending in the group of resource-rich countries was also assessed in the work of Davis et al. (2001). The presented results are not conclusive. While analysing the effectiveness of the stabilisation function of NRFs, some researchers (e.g. Clemente et al., 2002; Merlevede et al., 2009) took into account, apart from the manner of shaping government spending, the general stabilisation of the economic situation in the country. Crain and Devlin (2002), analysing data on 71 countries in the years 1970-2000, took into account the level of government spending, as well as economic and demographic results obtained in the studied economies. The positive impact of NRFs on reducing the volatility of economic development, especially in countries specialising in oil exports, was confirmed. Shabsigh and Ilahi (2007) also took into account changes in inflation and the real exchange rate. The survey results confirm the negative impact of funds on the level of the indicators analysed. In the work of Ossowski et al. (2008), three measures of fiscal results

of the state were used: primary balance excluding results of the oil industry, increase in government expenditure and ratio between changes in government expenditure and oil prices. The results of the study are not conclusive. Attention was, however, paid to the importance of institutional conditions (including stability of the political situation, level of corruption and rent seeking) for effective operation of the NRF policy. It was found that the higher the quality of institutions created in the country, the more stable the country's economic situation. The importance of the institutional framework under the issue of effective operation of stabilisation funds was also highlighted in the study by Frankel, Vegh and Vuletin (2012).

Bagattini (2011) analysed 12 countries with functioning resource funds for the years 1992-2007 taking into account the indicator based on six variables: level and change in the general budget balance, level and change in the budget balance without the participation of the natural resource industry, change in non-resource revenues and change in public debt. The presented results confirmed the effectiveness of NRFs as a means of counteracting the instability of fiscal policy and the increase in the level of public debt. At work, as in the case of Ossowski et al. (2008) and Frankel, Vegha and Vuletina (2012), attention was drawn to the essence of political stability in the country and the quality of fund management, including transparency and responsible operation of the NRF.

Sugawara (2014) set the main goal of his study to determine the importance of the stabilisation fund in reducing the volatility of expenditure in countries rich in natural resources. As a result of the analysis of 68 countries over a 25-year period, he found that the countries in which the stabilisation fund was created are characterised by greater stability of government spending. He also found that there was a negative relationship between the fund's operation and the lack of stability in total expenditure. In addition to assessing changes in government expenditure and total expenditure, the study took into account the following categories: the structure of the economy, economic management, the financial market and the political institution.

Asik (2017) focused his attention on analysing the impact of funds on levelling the instability of the economic situation in a resource-rich country and filling the counter-cyclical nature of the state's fiscal policy. After conducting the study, based on data from 29 countries specialising in the export of crude oil for the years 1980-2012, he presented a conclusion confirming the effectiveness of NRFs. The concept of efficiency referred to the degree of fiscal countercyclicality, taking into account the goal of smoothing fiscal revenues and expenses by creating a savings tool in the form of a resource fund. The following indicators were taken into account: volatility of the level of real household consumption, real government expenditure, as well as gross capital investment. An additional analysis was also carried out taking into account the assessment of the premises for the creation of an NRF and the importance of the institutional framework formed. An important proposal was also made to assess the nature of changes in government spending. It was found that it is important to analyse whether the trend of changes in spending is constant and does not depend on changes on the global natural

resources market rather than assessing whether expenses are at a constant level, as economic growth, often associated with increased state investment, is high in countries with significant developmental demand. According to the author, it is important not to stop the increase in state spending, but to maintain a stable trend of their changes.

When analysing literature on the subject of assessing the effectiveness of NRFs, two documents developed in recent years should be mentioned. The first is the so-called Santiago Principles. In 2009, due to the growing attention paid to SWF activities, a group of 23 leading global sovereign investors created the International Forum of Sovereign Wealth Funds, a global non-profit organisation of sovereign wealth funds involved in cooperation and strengthening SWF communities through dialogue, research and self-evaluation. During the Summit in Chile in September 2008, the Forum, in cooperation with international institutions such as the G20, the International Monetary Fund and the US Department of the Treasury, distinguished 24 general principles and practices (Santiago Principles) that form the basis of an effective SWF. The proposed rules are aimed at promoting good management, cost-effectiveness, transparency and prudent investment practices of the fund. The Santiago Principles are guidelines that should be followed by the management board of an SWF in order to maintain a stable global financial system, proper risk control and a sound fund management structure (IWG, 2008). The proposed document contains rules regarding the operation of Sovereign Wealth Funds. However, due to the fact that a significant part of SWFs are resource funds, it is justified to include the Santiago Principles in the overall assessment of NRF effectiveness.

As part of the analysis of the measures of the effectiveness of resource funds, the Natural Resource Charter presented by the Natural Resource Governance Institute (NRGI, 2019) should also be mentioned. The Charter is a set of principles developed upon the initiative of the International Monetary Fund and the World Bank by a group of independent practitioners and academic staff for governments and societies of countries rich in natural resources. The document provides guidance on how to best use the opportunities created by the extraction of resources for economic development. The assumptions presented in the Natural Resources Charter concern the general principles of conducting a state's economic policy aimed at counteracting the resource curse. As with the Santiago Principles, they can, however, be useful in assessing the effectiveness of NRFs in countries rich in natural resources.

Analysing literature on the subject devoted to the issue of the effectiveness of resource funds in counteracting the resource curse, it should be confirmed that the results presented are inconclusive, the adopted methodological assumptions are not uniform, and NRFs are often evaluated solely in terms of fulfilling the stabilising function. Most studies mention the paradox of plenty, but superficially, focusing primarily on the volatility of commodity prices and the increase in budget spending as the main reasons for its occurrence. The resource curse is, however, a complex and multidimensional phenomenon. It is important to refer individual functions of the resource fund to the main symptoms of the paradox and then to determine the indicators for assessing the effectiveness of an NRF.

4. Indicators of NRF performance evaluation

Literature on the subject (Dymitrowska, 2015, p. 74) identifies four main macroeconomic reasons for the occurrence of the paradox of plenty, making up the so-called vicious circle of the resource curse (Figure 2) - two endogenous: Dutch disease and the economy's dependence on the resource industry, and two exogenous: volatility of resource prices and long-term deterioration of Terms of Trade (ToT).
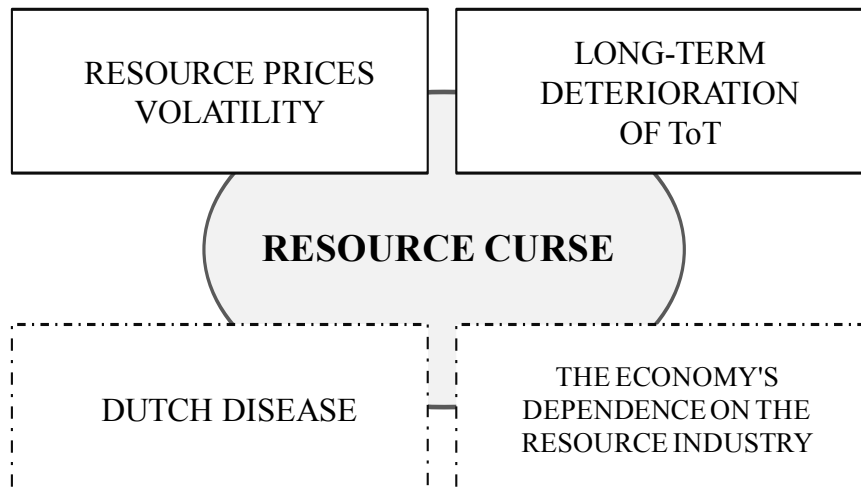
Figure 2. Vicious circle of the resource curse. Adapted from: "Klątwa bogactwa a polityka gospodarcza państwa" by Y. Dymitrowska. Copyright 2015 SimplePublishing.

The determinants of the resource curse are closely related. Exogenous factors lead to a paradox of plenty in the case of a significant dependence of a country's economy on the extraction and export of natural resources. At the same time, fluctuations in resource prices contribute to the emergence of the Dutch disease, which results in the long-term dependence of a country's economy on the mining sector. The overall objective of the resource fund is to provide long-term stable economic growth of a country which exports natural resources, which is equivalent to counteracting the resource curse. Stabilisation funds, which perform a stabilisation function and usually sterilisation as well, are primarily aimed at not making the domestic economy dependent on unstable price changes on the global natural resource market. The main task of stabilisation funds is therefore to directly influence two factors of the curse – volatility of natural resource prices and the resulting Dutch disease (Figure 3). A similar approach was presented in the study of Ossowski et al. (2008) and Bagattini (2011). Indirectly, the fulfilment of these functions also leads to levelling the long-term deterioration of ToT and to reducing the dependence of a country's economy on the resource industry. However, it should be noted that the last two determinants are not a direct task of the stabilisation fund, the main role of which is to stabilise the economic situation in the country and immunise the economy against so-called resource booms. Many funds established in those poorest countries rich in natural resources primarily play a stabilising role. Therefore, as already mentioned,

the fulfilment of the stabilisation task is most often analysed when examining the fund's effectiveness.

→ / – ➤   *direct / indirect operation of the development function*
→ / – ➤   *direct / indirect operation of the stabilisation and sterilisation function*
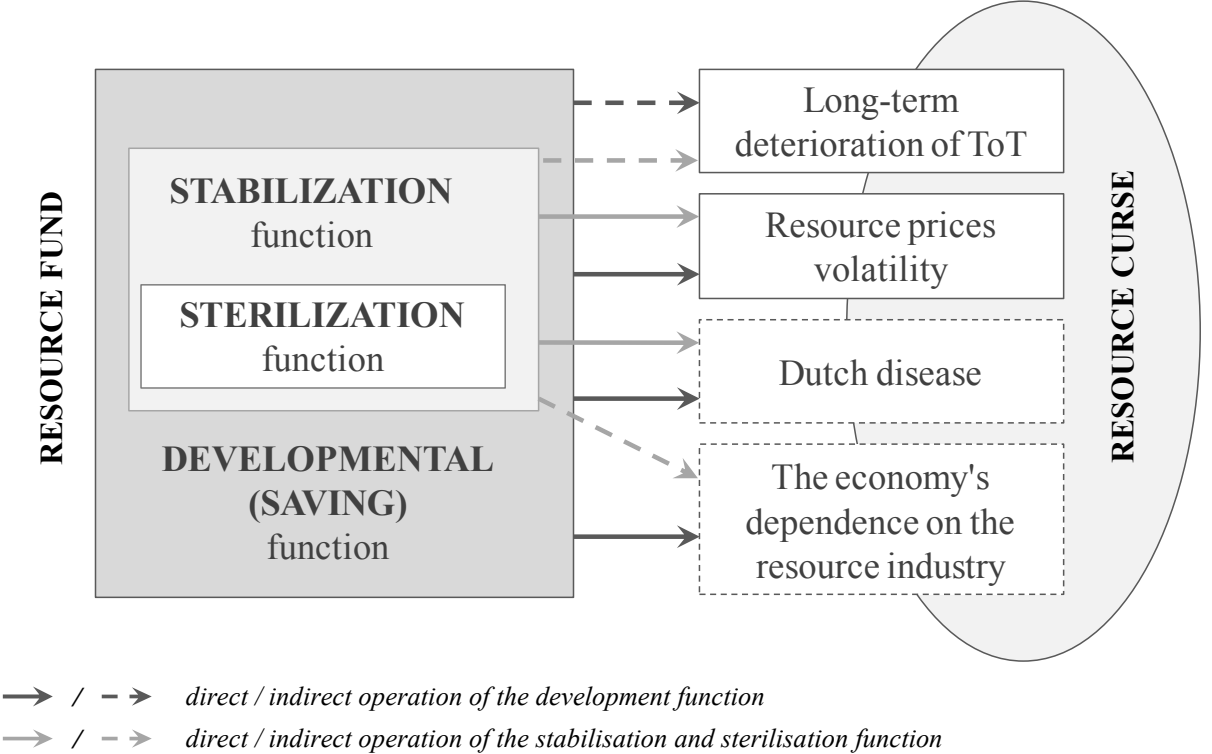
Figure 3. Relating the NRF function to the determinants of the resource curse. Adapted from: own study.

The growth fund, which mainly fulfils the development (savings) function of the NRF, although operating in a different manner to the stabilisation fund, also aims to stabilise the long-term economic development of the country, and thus it directly affects the instability of prices of natural resources and Dutch disease (Figure 3). This means that the growth fund also acts as a stabilisation fund. However, it should be noted that there is no inverse relationship. The funds accumulated in the stabilisation fund are invested in short-term assets, which means that the fund does not fulfil the function of long-term savings. Fulfilling the pro-development role of the growth fund also allows for diversification of the economy in the long term by changing the country's position from an exporter of natural resources to an exporter of financial capital, consequently reducing the dependence of economic development solely on the operations of the mining industry. Therefore, the operation of the development function of the NRF on the level of dependence of the economy on the natural resource industry should be defined as direct.

The long-term deterioration of ToT is both the cause and the result of the resource curse. Therefore, the impact of an NRF policy on this factor in each of the functions considered is indirect. The theory of long-term deterioration of ToT in the context of the resource curse is largely related to the thesis of Prebisch/Singer (Prebisch, 1950; Singer, 1950), according to which a country whose economy depends only on the production of natural resources and/or basic goods, in the long run, is able to import fewer and fewer investment products, which slows its long-term development. Due to the fact that in recent years there have been studies

confirming the validity of Prebish/Singer's thesis (e.g. Harvey et al., 2010; Rynarzewski, 2013), it should be included in the analysis of the resource curse. However, due to the indirect nature of the discussed factor, its importance in the context of analysing the effectiveness of an NRF is negligible.

Depending on the function of a resource fund, the effectiveness of its operation should be tested differently. At the same time, it should be remembered that the growth fund fulfils the tasks of a stabilisation fund. A list of indicators enabling the assessment of a fund's effectiveness in the category of the resource curse depending on the functions and tasks assigned to the fund is presented in Table 2.

Table 2.
List of indicators enabling the assessment of NRF effectiveness in the category of the resource curse

	FUNCTION	*MAIN TASKS*	*INDICATORS TO ASSESS THE IMPLEMENTATION OF THE TASKS*
RESOURCE FUND	Stabilisation	stabilisation of government spending	change in the level of government spending
			comparing the change in the level of government spending with the change in income from resource exports and the change in prices of natural resources on the global market
		counteracting Dutch disease	change in real non-resource GDP *per capita*
			change in added value of non-resource sectors
	Sterilisation	isolating the economy from surplus revenues from export of natural resources	fund structure (level of domestic and foreign investments)
	Developmental (savings)	increasing long-term public savings	change in the level of funds accumulated in the fund (value of the fund)
		-	fund investment return rate
		increasing long-term state investment	change in the level of long-term foreign investments carried out by the fund
		diversification of the economy in the form of a change of role from an exporter of resources to an exporter of financial capital	number of enterprises in the fund's portfolio, number of host countries, position of the fund in rankings
			GDP structure
			structure of the state budget
	Other indirect	stable long-term economic development of the country (in the context of the resource curse)	change in real GDP *per capita*
			change of the HDI coefficient level
			level of dependence of the economy on the mining industry (average annual revenues of the mining industry (in % of GDP), average annual exports of natural resources (in % of total exports), average annual revenues of the mining industry (in % of total state budget income))
			change in society's income disparity (Gini coefficient)
		transparent and responsible operation of the fund	fulfilment of the Santiago Principles

Adapted from: own study.

The stabilising function of the natural resource fund assumes the stabilisation of revenues from the export of natural resources, the stabilisation of expenditure in the country and indirectly counteracting Dutch disease and enabling stable long-term economic development. Considering the essence of the NRF, which is a state entity, as the main stabilisation task,

it is necessary to specify the stabilisation of budget expenditure so that the budget can be made independent of changes in the level of income from resource exports and from prices of natural resources on the global market. An indicator enabling the assessment of the implementation of the stabilisation task is the change in the level of government spending. It is reasonable to simultaneously adopt the assumption presented by Asik (2017) about the importance of stability of government spending, rather than maintaining its constant level. Developing countries are characterised by rapid economic growth, often associated with increasing state investment. Therefore, it is important that the fiscal policy of the state is stable and balanced and that the trend in shaping government spending does not show any breakdowns occurring on the global natural resource market. When analysing the effectiveness of the fund's countercyclical operation, it is important to compare the change in the level of government spending with the change in income from resource exports and the change in prices of natural resources on the global market.

Dutch disease is one of the main macroeconomic endogenous causes of the resource curse. At the same time, it is the first alarming symptom resulting from the lack of stability in the international commodity market. Therefore, in the context of the stabilisation function performed by the fund, it is important to assess the occurrence of signs of the disease in the country. Due to the fact that the phenomenon discussed relates to the takeover of the dominant role on the domestic market by the mining industry and a decrease in competitiveness, a reduction of activity level and often the bankruptcy of enterprises from other industries with a simultaneous increase in real GDP in the country by universal indicators enabling assessment of the appearance of the Dutch disease, there is a change in real non-resource GDP *per capita* and a change in the added value of non-resource sectors. The above-mentioned indicators make it possible to estimate whether domestic income is driven exclusively by the mining industry or also by the development of other industries. At the same time, it should be noted that the expected result is not necessarily an increase in the indices presented, but no sharp decline. An analysis of non-resource GDP *per capita* and the change in the added value of non-resource sectors allows for a preliminary assessment of the occurrence of Dutch disease[5].

The NRF sterilisation function is directly related to the stabilisation task and consists in increasing the resistance of the national economy to the consequences of natural resource booms. Assessment of the sterilisation task can be done by analysing the fund structure. The greater the share of foreign investment in NRF activities, the more the sterilisation function is fulfilled.

When analysing the effectiveness of the growth fund, all the aforementioned indicators should be taken into account. In addition, the fund is designed to increase long-term public savings and increase long-term state investment. Assessment of the achievement of the set goals

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[5] In order to carry out more detailed research, a number of additional indicators can be used, presented for example in the study (Dymitrowska, 2015, p. 75).

can be made through a detailed analysis of the state and the international position of the fund by estimating the value of the fund and the change in the level of accumulated funds over time, the rate of return on the fund's investments and the degree of long-term foreign investments implemented. Enabling the diversification of the economy by changing the role of the country on the international market from an exporter of natural resources to an exporter of financial capital can be assessed by analysing the number of enterprises in the growth fund portfolio and the number of host countries, as well as estimating the position of the NRF in the international rankings of the largest SWFs in the world.

The policy of the national resource fund assumes a direct impact on the level of state expenditure and the occurrence of Dutch disease and, in the case of the growth fund, also on reducing the economy's dependence on the mining industry. Due to the fact that the fund does not actually play a strict role in the context of any further economic policy pursued by the state, long-term economic development should be included in the additional indirect objectives of the NRF. In the context of the resource curse when assessing the economic development of countries specialising in the export of natural resources, apart from the indicators distinguished in the analysis of Dutch disease, one should take into account the change in real GDP *per capita*, the change in the HDI ratio, the level of dependence of the economy on the mining industry (based on the average annual revenues of the mining industry (in % of GDP), the average annual exports of natural resources (in % of total exports), the average annual revenues of the mining industry (in % of total state budget income)) and any change in the society's income disparity (based on the Gini coefficient).

When analysing the effectiveness of NRFs in literature on the subject, the importance of transparent and responsible operation of the fund is often emphasised. Therefore, when assessing the fund's effectiveness, it is important to evaluate its performance in this category. The level of good management, transparency and prudent investment practices of the fund can be determined by comparing the NRF operating standards with the Santiago Principles.

5. Conclusions

The natural resource fund is a tool of a state's economic policy, consisting in the creation of a state entity aimed at managing revenues from the export of natural resources in such a way as to enable stable, long-term economic development of a country exporting resources. Due to the state form of the fund and the national nature of natural resources, an appropriate name is also the national resource fund. In the case of resource-rich countries, enabling sustainable economic development is tantamount to counteracting the resource curse, consisting in slower economic development in countries specialising in the export of natural resources compared to countries whose resources are scarce.

The main function performed by the NRF is a stabilising function, which is aimed at separating the domestic economy from unstable changes taking place on the global natural resource market. The stabilisation function also consists in creating a so-called buffer retaining significant revenues from the export of natural resources before their massive inflow into the country, leading to Dutch disease and the resource curse in the long run. The NRF sterilisation function further strengthens the protective effect by investing accumulated funds on foreign markets. The two NRF functions presented are closely related.

The most advanced form of the natural resource fund is the growth fund, which, apart from stabilising and sterilising functions, also takes on the task of long-term savings. All funds collected from the sale of natural resources are allocated for long-term investments on foreign markets. The country uses only profits generated by the fund's activities. The growth fund may be part of the NRF, under which the funds are divided between the stabilisation and growth fund or a separate state body. An extreme approach is to establish only a pro-development form of the fund, as was done e.g. in Norway. In the poorest countries specialising in the extraction and export of natural resources, this solution seems to have little effect, although the results of the research are not clear. Due to the emergence of new funds from developing countries on the international NRF market, e.g. the East Timor Oil Fund, the issue of the efficiency of the operation of natural resource funds in the poorest countries should be subjected to detailed analysis as part of future research. It should also be noted that the growth fund has a stabilising function, but there is no inverse relationship. The creation of a long-term savings fund also provides the opportunity to diversify the economy by changing the country's role in the long term from a natural resources exporter to a financial capital exporter.

National natural resource funds are a form of sovereign wealth funds, but they play a key role within the SWF. The importance of NRFs on the global financial market is constantly growing, so the problem of their effective operation is important both from the point of view of the interest of natural resource exporters and the stability of the global economy. The results of empirical research devoted to assessing the effectiveness of the functioning of funds are not explicit. As part of the analyses, different research assumptions are adopted, and various efficiency measures are used. The key goal of this study was to distinguish indicators that allow for assessing the effectiveness of natural resource funds in the context of the resource curse in countries rich in natural resource deposits. The indicators identified on the basis of a thorough analysis of literature on the subject, depending on the functions and tasks assigned to the fund, are presented in Table 2. The presented measures have practical significance. They can be used in further research aimed at assessing the effectiveness of NRFs in both the group of countries rich in natural resources and in individual case studies. An additional cognitive value of the article is the system of natural resource funds presented in Figure 1, as well as the reference of individual NRF functions to the determinants of the resource curse (Figure 3).

References

1. Acemoglu, D., Johnson, S., and Robinson, A. (2001). The colonial origins of comparative development: an empirical investigation. *American Economic Review, 91*.

2. Aizenman, J., and Glick, R. (2009). Sovereign Wealth Funds: Stylized Facts about their Determinants and Governance. *International Finance, 12/3*.

3. Arezki, R., and Van der Ploeg, F. (2007). Can the natural resource curse be turned into a blessing? The role of trade policies and institutions. *CEPR Discussion Paper, 6225*.

4. Auty, R.M. (1993). *Sustaining Development In Mineral Economies: The Resource Curse Thesis*. London: Routledge.

5. Auty, R.M. (2001). *Resource abundance and economic development*. Oxford: Oxford University Press.

6. Bagattini, G.Y. (2011). *The Political Economy of Stabilisation Funds: Measuring their Success in Resource-Dependent Countries*. Brighton: Institute of Development Studies, University of Sussex, IDS Working Paper, 356.

7. Barma, N.H., Kaiser, K., Le, T.M. and Viñuela, L. (2012). *Rents to Riches? The Political Economy of Natural Resource-Led Development*. Washington D.C.: World Bank.

8. BRSP (2006). *Meeting the Challenge of the Resource Curse. International Experiences in Managing the Risks and Realising the Opportunities of Non-Renewable Natural Resource Revenue Management*. London: Programme on Business and Development Performance, United Nations Development Programme, Overseas Development Institute.

9. Bulte, E., Damania, R., and Deacon, R. (2005). Resource Intensity, Institutions, and Development. *World Development, Elsevier, 33*.

10. Clemente, L., Faris, R., and Puente, A. (2002). *Natural Resource Dependence, Volatility and Economic Performance in Venezuela: The Role of a Stabilization Fund*. Cambridge: Andean Competitiveness Project Working Paper, Center for International Development, Harvard University.

11. Corden, W.M., and Neary, J.P. (1982). Booming sector and de-industrialization in a small open economy. *Economic Journal, 92*.

12. Crain, W.M., and Devlin, J. (2002). *Nonrenewable Resource Funds: A Red Herring for Fiscal Stability?* Washington D.C.: World Bank, Draft working paper.

13. Davis, J., Ossowski, R., Daniel, J., and Barnett, S. (2001). Stabilization and savings funds for non-renewable resources. *International Monetary Fund, Occasional paper, 205*.

14. Devlin, J., and Lewin, M. (2005). Managing Oil Booms and Busts in Developing Countries. In: J. Aizenman, and B. Pinto (Eds.), *Managing Economic Volatility and Crises: A Practitioner's Guide*. New York: Cambridge University Press.

15. Dymitrowska, Y. (2015). *"Klątwa bogactwa" a polityka gospodarcza państwa*. Poznań: SimplePublishing.

16. Fasano, U. (2000). *Review of the Experience with Oil Stabilization and Savings Funds in Selected Countries*. Washington D.C.: International Monetary Fund, IMF Working Paper, 00/112.

17. Fasano, U. (2002). With open economy and sound policies, U.A.E. has turned oil "curse" into a blessing. *IMF Survey, 31*.

18. Frankel, J. (2010). *The Natural Resource Curse: A Survey*. Cambridge: Harvard Environmental Economics Program, Discussion Papers, 21, Harvard Kennedy School, Harvard University.

19. Frankel, J., Vegh, C., and Vuletin, G. (2012). On Graduation from Fiscal Procyclicality. *Journal of Development Economics, 100/1*.

20. Harvey, D.I., Kellard, N.M., Madsen, J.B., and Wohar M.E. (2010). The Prebisch-Singer Hypothesis: Four Centuries of Evidence. *The Review of Economics and Statistics, 92*.

21. IFSWF (2019). *International Forum of Sovereign Wealth Funds, Our Members*. Available online https://www.ifswf.org/our-members, 19.09.2019.

22. IMF (2012). *Global Financial Stability Report: The Quest for Lasting Stability*. Washington D.C.: World Economic and Financial Surveys, International Monetary Fund.

23. IWG (2008). *Sovereign Wealth Funds Generally Accepted Principles and Practices „Santiago Principles"*. International Working Group of Sovereign Wealth Funds.

24. Krueger, A. (1974). The Political Economy of the Rent-Seeking Society. *American Economic Review, American Economic Association, 64*.

25. Larsen, E.R. (2005). Are rich countries immune to the resource curse? Evidence from Norway's management of its oil riches. *Resources Policy, Elsevier, 30*.

26. Marchewka-Bartkowiak, K. (2009). Państwowe fundusze stabilizacyjne – problem czy szansa na długoterminowe równoważenie budżetu państwa. In: A. Szewczuk (Ed.), *Finanse 2009 – Teoria i praktyka, Finanse publiczne, I*. Szczecin: Wydawnictwo Naukowe Uniwersytetu Szczecińskiego.

27. Merlevede, B., Schoors, K., and Van Aarle, B. (2009). Russia from Bust to Boom and Back: Oil Price, Dutch Disease and Stabilisation Fund. *Comparative Economic Studies, 51/2*.

28. Mikesell, R.F. (1997). Explaining the resource curse, with special reference to mineral exporting countries. *Resource Policy, 23*.

29. Neumayer, E. (2004). Does the "Resource Curse" Hold for Growth in Genuine Income as Well? *World Development, Elsevier, 32*.

30. NRGI (2019). *Natural Resource Governance Institute, Natural Resource Charter*. Available online https://resourcegovernance.org/approach/natural-resource-charter, 19.09.2019.

31. Ossowski, R., Villafuerte, M., Medas, P.A., and Thomas, T. (2008). *Managing the Oil Revenue Boom: The Role of Fiscal Institutions*. Washington D.C.: International Monetary Fund, IMF Occasional Paper, 260.

32. Prebisch, R. (1950). *The economic development of Latin America and its principal problems*. New York: United Nations, Lake Success.

33. Rasiah, R., and Shari, I. (2001). Market, government and Malaysia's new economic policy. *Cambridge Journal of Economics, 25.*

34. Rynarzewski, T. (2013). Refleksje o dylematach wpływu handlu zagranicznego na rozwój gospodarczy krajów słabo zaawansowanych ekonomicznie. *Studia Oeconomica Posnaniensia, 1.*

35. Sachs, J.D., and Warner, A.M. (2001). Natural Resources and Economic Development. The curse of natural resources. *European Economic Review, Elsevier, 45.*

36. Sarraf, M. and Jiwanji, M. (2001). Beating the resource curse: the case of Botswana. *Environmental Economics Series, 83/291.*

37. Shabsigh, G., and Ilahi, N. (2007). *Looking Beyond the Fiscal: Do Oil Funds Bring Macroeconomic Stability?* Washington, D.C.: International Monetary Fund, IMF Working Paper, 07/96.

38. Singer, H.W. (1950). The distribution of gains between investing and borrowing countries. *American Economic Review, 40.*

39. Stevens, P. (2003a). *Resource Impact: Curse or Blessing? A literature survey.* Dundee: Centre for Energy, Petroleum and Mineral Law and Policy, University of Dundee.

40. Stevens, P. (2003b). *Resource Impact: A curse or a blessing?* Dundee: Centre for Energy, Petroleum and Mineral Law and Policy, University of Dundee.

41. Stijns, J. (2005). Natural resource abundance and economic growth revisited. *Resources Policy, Elsevier, 30.*

42. Sugawara, N. (2014). *From Volatility to Stability in Expenditure: Stabilization Funds in Resource-Rich Countries.* Washington, D.C.: International Monetary Fund, IMF Working Paper, WP/14/43.

43. Sun, T., and Hesse, H. (2010). Sovereign Wealth Funds and Financial Stability: An Event-Study Analysis. In: S.D. Udaibir, A. Mazarei, and H. van der Hoorn (Eds.), *Economics of Sovereign Wealth Funds: Issues for Policymakers.* Washington D.C.: International Monetary Fund.

44. SWFI (2019). *Top 81 Largest Sovereign Wealth Fund Rankings by Total Assets,* Sovereign Wealth Fund Institute, Fund Rankings, SWF, Available online https://www.swfinstitute.org/fund-rankings/sovereign-wealth-fund, 19.08.2019.

45. Urban, D. (2017). *Państwowe Fundusze Majątkowe. Pomiędzy krajową gospodarką a globalnymi rynkami finansowymi.* Łódź: Wydawnictwo Uniwersytetu Łódzkiego.

46. Usui, N. (1997). Dutch disease and policy adjustments to the oil boom: a comparative study of Indonesia and Mexico. *Resources Policy, 23.*

47. Wiśniewski, P. (2011). *Ekspansja państwowych funduszy majątkowych a nowy protekcjonizm inwestycyjny w gospodarce światowej. Część I. Definicja, klasyfikacja oraz istotność SWF w gospodarce światowej.* Warszawa: Studia I Prace Kolegium Zarządzania i Finansów SFH, Zeszyt Naukowy nr 111, SGH.

48. Wright, G., and Czelutsa, J. (2002). *Resource-based economic growth, past and present.* Stanford University.

CONSUMPTION OF STEEL IN POLAND –
QUANTITY ANALYSIS IN TIME

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Abstract: The steel market in Poland has increased over the last few years in the market economy. Domestic steel producers manufacture more crude steel and steel products. The consumption of steel increases more and more every year. The value of shipments from the Polish steel sector account for approx. 3% of industrial production. The Polish economy uses and processes over 8 million tonnes of steel (apparent consumption of crude steel/semi-products) yearly (average volume of steel consumption from 2000 to 2017). The largest user of crude steel is metal good, but the largest user of finished steel products is construction (more than 40%), followed by: machinery industry (15%), automotive (about 12%), transport equipment (4%), home appliances industry (3.5%) and other industry sectors, e.g. electrical equipment, electronics. Changes in domestic steel consumption are presented in the paper. The publication presents the historical trends and forecasts of quantity (volume) of steel consumption. The analysis of steel intensity was realised on the basis of apparent consumption of steel in device on: semi-products and finished steel products. Realised analysis is the base for building of scenarios of steel production by particular sectors of industry in Poland.

Keywords: enterprise transformation, Industry 4.0, heat treatment process.

1. Introduction

The industry sector processes and consumes many materials. Steel is a basic structural material, with a very wide range of applications. The functioning of the steel sector is strategic for economies in many countries. Steel intensity is a basic measure of the processing and use (consumption) of steel in industry. Steel intensity tests are carried out for a set settlement period. In the analysis of steel intensity (steel internist) should be taken into account the balance of foreign trade. The basic scope of the analysis is apparent steel use. Steel intensity analysis is prepared in quantitative, numerical (physical, natural units) or value (price) terms. The subject scope of the analyses may relate to crude steel as semi-products or finished steel products. The time range of steel intensity analysis can be past (historical) or future (predictive). The analysis also uses indicators: the amount or value of steel consumed per unit of GDP or per one inhabitant of a given country. The World Steel Association proposed a method for

calculating the actual consumption of steel based on the following indicators: SWIP – Steel Weighted Industrial Production and TSU – True Steel Use (Worldsteel, 2012; 2017). In Poland, a popular method of measuring steel consumption is apparent steel use calculated as steel production minus export plus import. The scope of the apparent steel use analysis can be implemented and presented in relation to semi-products (crude steel) but steel products (finished steel products) in device on long and flat products and tube. When analysing steel consumption in the economy, it is assumed that there is an impact of input-output flows of steel products on the final level of consumption. The methodology avoids double or multiple classification of the amount of steel consumption by individual market participants is constantly improved (Worldsteel, 2012). Final steel consumption is also affected by the level of stocks of steel products at the end user. Analysing this phenomenon, you can encounter the following problems. In addition, the trend of apparent consumption of steel is overlapped by periodic fluctuations caused by the economic situation (such fluctuations may cause an increase or decrease in apparent consumption of steel in the analysed period).

The level of steel consumption is analysed by global and European steel organisations (e.g. World Steel Association, Eurofer, Eurostat). The scope of analysis varies for environments, and it is handled by economists, politicians, scientists and others. In Central and Eastern European countries, for many years, the topic of steel consumption has been analysed in relation to changes in the economy after the transformation from a centrally controlled economy to a market economy. This scope of analysis can be found in publications, among others, by employees of the Institute of Iron Metallurgy (Szulc, 2014; Szulc, Garbarz, Paduch, 2011) and university staff (Kardas, 2010). During the transition, the theme of steel consumption was also carried out by foreign authors in the field of changes in their countries (e.g. Morariu, and Bostan, 2012; Bostan, and Onofrei, 2012). The topic of steel consumption is a part of research in assessing the situation of the economy, e.g. in the case of the Central Statistical Office and the Polish Steel Association. The scope of the analysis of steel consumption is carried out on the basis of individual economies (Rębiasz, Garbarz, and Szulc, 2004; Rębiasz, 2003), the European economy (Eurofer & Oxford Economics, February 2018) and the global economy (Worldsteel & Oxford Economics, May 2019).

2. Resources and methods

A time series was used to analyse steel consumption in Poland as a function of time. The analysis performed was based on empirical data: steel production (million tonnes) and apparent consumption of steel (million tonnes) from 2000 to 2017. The data used is presented in Table 1. The empirical data is from the Polish Steel Association in Katowice. On the basis of empirical data, historical trends of steel intensity (apparent consumption of steel) in Poland

in 2000-2017 were analysed, and forecasts of steel intensity (apparent consumption of steel) until 2022 were estimated. To calculate apparent consumption of steel the following formula was used:

apparent consumption of steel = steel production – export + import   (1)

Empirical data was divided into: apparent consumption of semi-products and apparent consumption of finished products (Table 1).

Table 1.
Empirical data used in analysis of apparent steel use in Poland (million tonnes)

Year	Steel production	Apparent steel use/semi-products	Apparent steel use/finished steel products
2000	8.800	7.945	7.573
2001	8.400	7.500	7.106
2002	8.368	7.364	7.080
2003	9.107	8.217	7.716
2004	10.593	9.199	8.470
2005	8.444	7.494	8.374
2006	9.992	9.597	10.662
2007	10.632	9.759	12.051
2008	9.728	8.725	11.517
2009	7.129	6.625	8.194
2010	7.993	7.618	9.952
2011	8.779	8.267	11.021
2012	8.358	8.314	10.406
2013	7.950	8.199	10.397
2014	8.558	8.242	12.278
2015	9.198	8.759	12.579
2016	9.015	8.622	13.148
2017	10.330	10.076	13.601
2018	10.157	10.237	14.895

Source: Polish Steel Association (HIPH) in Katowice.

The research process was carried out in two stages:

1. Analysis of historical trend of apparent consumption of steel in device on: semi-products and finished steel products.
2. Building of forecasts of apparent consumption of steel in device on: semi-products and finished steel products and their analyses.

The structure of the analysis is presented in Figure 1.
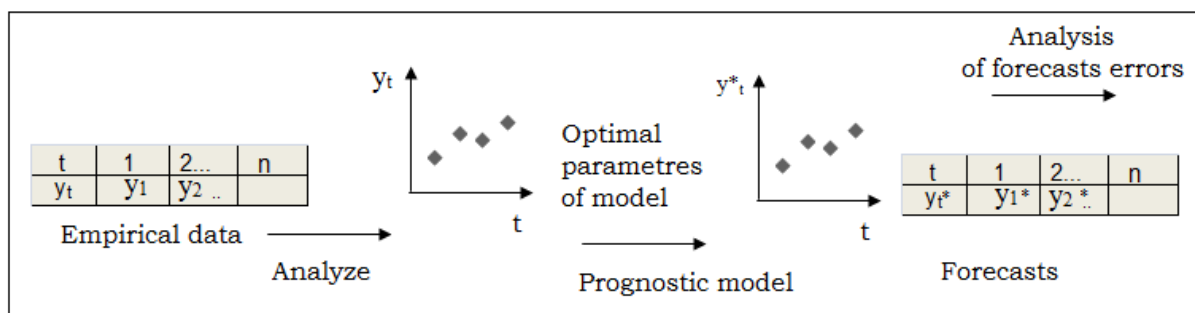
Figure 1. The structure of the analysis of apparent steel use. Source: own elaboration.

The time series (data from Table 1 – columns 3 and 4) are traditionally presented by means of a standard chart (Figure 2), in which the abscissa contained successive natural numbers ($t = 1, ..., 18$), representing subsequent years, and on the axis ordinates of the value of the studied phenomenon (quantity of apparent consumption of steel). Figure 2 is a form of presentation of the studied phenomenon as a one-dimensional time series (chronological series).
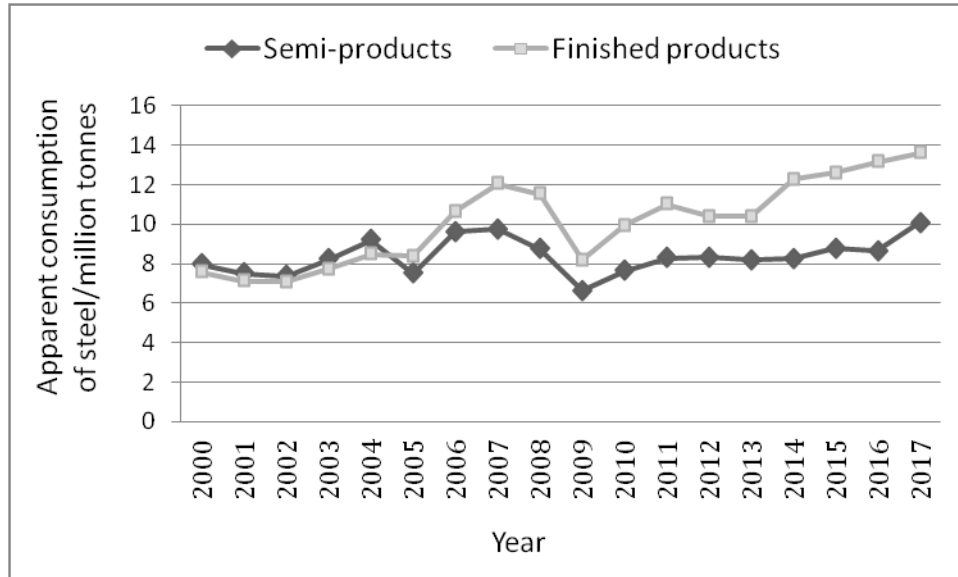
Figure 2. Apparent steel consumption in Poland from 2000 to 2017. Source: own elaboration.

On the basis of the visual assessment of the graph prepared, a development trend was found, but with periodic fluctuations caused by the economic situation. The highest level of periodic fluctuations was recorded in 2009 as a result of the impact of the global economic crisis on the Polish economy (Gajdzik, 2013).

The study did not assume "a priori" the use of analytical models in the form of a trend function for forecasting, due to the complexity of the phenomenon and the low level of matching (R2 – coefficient of determination). Classic forecasting methods for the linear function (linear function model) and nonlinear function (function models: exponential, logarithmic, power, hyperbolic and polynomial) were rejected. Various adaptation mechanisms (time series smoothing algorithms) were used for forecasting. Development tendency models were used to develop the forecasts. Models of developmental tendencies are models in which time is the only explanatory variable (Szkutnik, and Balcerowicz-Szkutnik, 2006, p. 14). They have the form:

$$Y = f(t, \xi) \tag{2}$$

Time in the form of a time series was the basis for preparing the forecast for 2018-2022. Real data on steel consumption in 2018 (last row in Table 1) was used to calculate the absolute (3) and relative forecast error (4) for a single moment, for $t = 2018$. Optimising the value of forecasts was also carried out on the basis of the root mean squared error of forecasts RMSE – Root Mean Square Error (5) and the mean relative prediction error (6) (Krawiec, 2014, pp. 7-10).

$$\Psi_t = y_t - y_t^* \tag{3}$$

$$\Psi_t = \frac{y_t - y_t^*}{y_t} * 100 \tag{4}$$

$$RMSE = \sqrt{\frac{1}{n-m}\sum_{t=m+1}^{n}(y_t - y_t^*)^2} \tag{5}$$

$$\Psi = \frac{1}{n-m}\sum_{t=m+1}^{n}\frac{|y_t - y_t^*|}{y_t} \tag{6}$$

where:

y_t – an empirical value, i.e. realisation of variable y in a t period of time ($t \in \overline{1,T}$),

y_t^* – the forecast value; n is the number of elements of the time series,

n – the number of elements in a time series,

m – the number of initial time moments t, for which an expired forecast has not been realised or is being treated as a part of the necessary start-up mechanism (Manikowski, and Tarapata, 2002, p. 70).

Forecasting knowledge is an integral part of the managerial process. It lowers the uncertainty and raises the accuracy of managerial decisions, which raises a company's efficiency. Pelikán (1999, p. 312) states that the forecasting results shape the inputs for the subsequent planning and decision-making step. The purpose of forecasting is to determine the future states of the studied phenomenon (Szkutnik, and Balcerowicz-Szkutnik, 2006, p. 9). The basic programming tool is the econometric model. According to Pawłowski (1980), the model is a formal structure that reflects the basic relationships between the phenomena studied. In this case, these are changes in steel consumption (semi-products and finished products) in Poland analysed in a given period of time (time series).

At the stage of forecasting of steel consumption using adaptive models, various models were tested: from elementary (naïve methods, simple moving average, weighted moving average – for time series with constant value (average) or with increasing tendency) to models of exponential smoothing (Holt's models, Brown's models, exponential autoregressive model, advanced exponential autoregressive model) and creep trend models.

The publication presents only optimal forecasts obtained using various methods. The forecasts whose errors were the smallest and the forecast trend characterised by high matching to empirical data were considered optimal.

The practical aspects of implementing forecasts of apparent consumption of steel for Poland using adaptive models are their use to develop development scenarios (optimistic, pessimistic and base/moderate scenarios) for individual industry sectors in Poland (Gajdzik, 2017; Gajdzik et al., 2018).

3. Steel consumption in historical analyses

An element of the analysis was steel production and consumption in Poland from 2000 to 2017 (Table 1). Trends of the examined phenomena have increases or decreases caused by the impact of the economic situations (Figure 3) in the years 2003-2005, 2007-2009 and 2012-2014 (cycles are marked with circles in Figure 3).
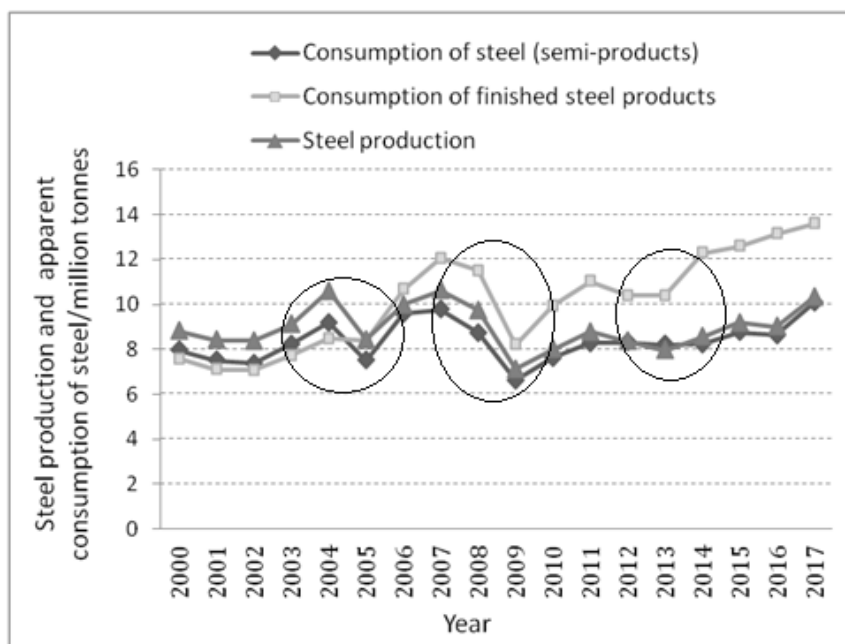
Figure 3. Steel production and apparent steel consumption in Poland from 2000 to 2017. Source: own elaboration.

The dynamics of changes in the volume of steel production (calculated year t to year $t-1$) indicate the largest increase in steel production in 2006 (18.3%) and the lowest in 2007 (6.4%). The largest decrease in the dynamics of production volume was in 2009 and amounted to -26.7%, and the smallest negative dynamics of changes were in 2002 (-0.4%) (Table 2). The average annual dynamics of steel size changes in the analysed period was 1.7%, and these were positive dynamics (increase in steel production in 2000-2017). On the other hand, the dynamics of explicit steel consumption (for semi-products) as an average annual value reached a level of 2.2% (increase in explicit steel consumption in 2000-2017). The highest increase in steel consumption (calculated year to year) was recorded in 2006 (28.1%), with the lowest in 2014 (0.5%). The largest decrease was in 2009 (-24.1%), and the smallest in 2013 (1.3%). The average annual change dynamics for final products was 4.3%. The highest increase in the consumption of final steel products was in 2006 (27.3%), and the lowest in 2015 (2.5%). The largest decrease in the dynamics of consumption of final products was in 2009 (-28.9%), and the lowest in 2013 (-0.1%). Changes in the dynamics of the studied phenomena are shown in Figure 4. The level of apparent annual consumption of crude steel (semi-finished products) in Poland was 8.362 million tonnes on average and 10.118 million tonnes on final products. Although the average annual consumption of finished steel products is higher, the consumption

is still too low. Finished stall products are high value than crude steel − semi-products (opinion of Polish Steel Association, Report: Polish steel industry, 2018, p. 20).

Table 2.
Analysis of steel production and consumption in Poland from 2000 to 2017 (%)

Year	Steel production	Apparent steel use/semi-products	Apparent steel use/finished steel products
2000	-	-	-
2001	-4.545	-5.601	-6.167
2002	-0.381	-1.813	-0.366
2003	8.831	11.583	8.983
2004	16.317	11.951	9.772
2005	-20.287	-18.535	-1.133
2006	18.333	28.062	27.323
2007	6.405	1.688	13.028
2008	-8.503	-10.595	-4.431
2009	-26.717	-24.069	-28.853
2010	12.120	14.989	21.455
2011	9.834	8.519	10.742
2012	-4.796	0.569	-5.580
2013	-4.882	-1.383	-0.086
2014	7.648	0.524	18.092
2015	7.478	6.273	2.452
2016	-1.990	-1.564	4.523
2017	14.587	16.864	3.445
Average value	1.732	2.203	4.305

Source: own elaboration.

Commentary on Figure 4: the largest positive increases in steel production and consumption were in 2006. The Polish economy has benefited from the high demand for steel that appeared on the world market, among others, with the organisation of sporting events in 2007 and significant acceleration of development in the post-communist countries of Central and Eastern Europe (Gajdzik, 2012), as well as in Asian countries. In addition, in 2007, the EU Economic Commission recognised that the process of restructuring steel mills in Poland was completed (Gajdzik, 2018), and the result was the decision-making independence of steel mills in the production of steel and steel products. The largest negative increases for steel production and consumption were recorded in 2009 as a result of the impact of the global economic crisis on the Polish economy.
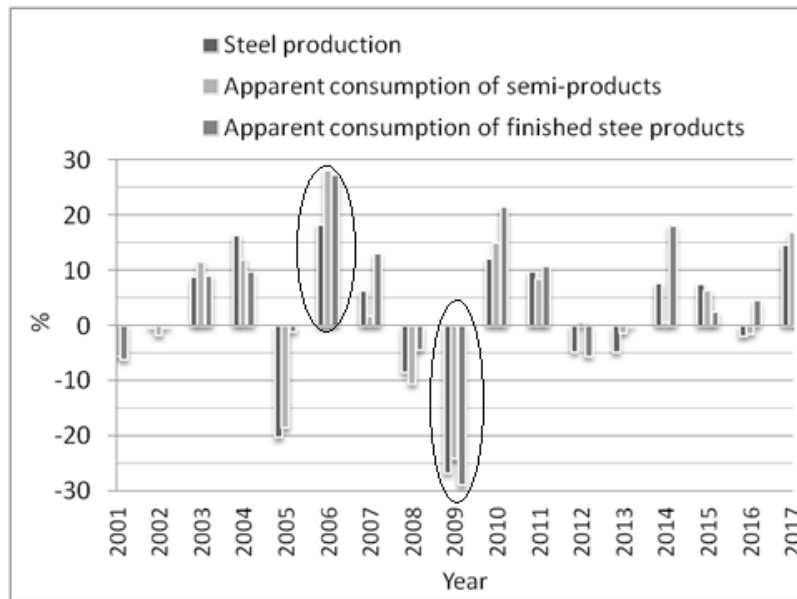
Figure 4. Changes in steel production and steel consumption in Poland from 2000 to 2017. Source: own elaboration.

4. Forecasts of steel consumption

Forecasting steel consumption is to provide the answer to the question: how will the volume (volume) of processed and consumed steel change in Poland in the coming years. The adopted forecasting period is a short-term period (forecasts until 2022). The scope of prognostic analysis is presented according to stages, which used individual types of models to forecast steel consumption. The presentation combined models obtained for the consumption of steel as crude steel (semi-products) and finished steel products.

4.1. Elementary models

Among the forecasts obtained on the basis of simple moving or weighted average moving models for a series forming around a constant value (elementary models), a better matching of forecasts was obtained for models with weights. The projected apparent consumption of crude steel (semi-products) did not exceed 9.8 million tonnes per year, but for finished products, the obtained projected apparent consumption was higher (13.4 million tonnes per year). The results of the analysis are presented in Figure 5.
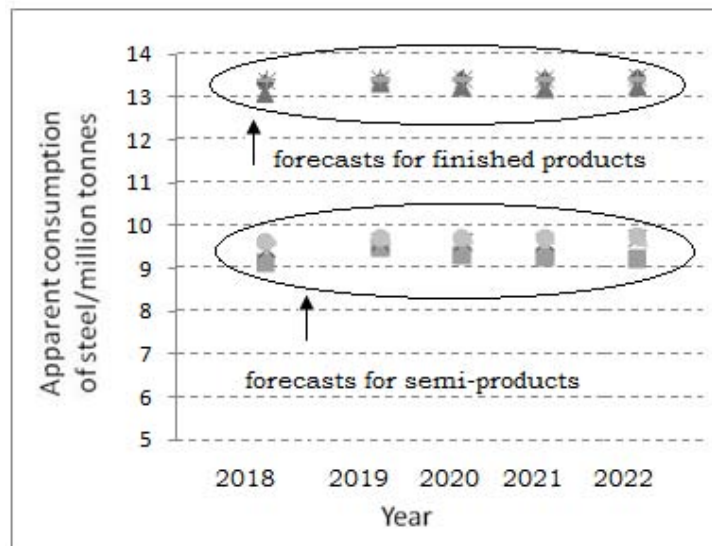
Figure 5. Forecasts of steel consumption for Poland until 2022 by using elementary models. Source: own elaboration.

By building forecasts using models of simple moving average for an increasing time series, the required fit of these forecasts was not maintained (high forecast errors). The forecasts obtained annually for the consumption of semi-finished products reached a high level of 13.7 million tonnes in 2022, and for finished products, 15.8 million tonnes in 2022. The forecasted amounts of steel consumption for semi-products and finished products by using the models were much higher than the actual amounts of average annual consumption from 2000 to 2017.

4.2. Exponential smoothing models

In exponential smoothing models, a good fit of forecasts to empirical data was obtained in single exponential smoothing models (Brown's model). After exponential smoothing, the forecasts of apparent consumption steel were below 9 million tonnes in the analysed year or slightly above this value, and for finished steel products, it was below 13.5 million tonnes. The results are presented in Figure 6.
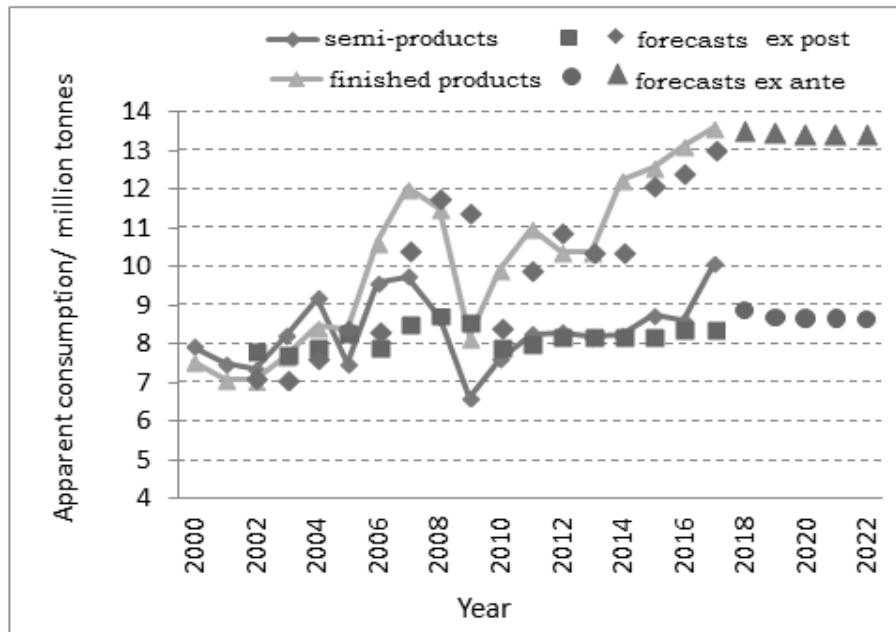
Figure 6. Forecasts of steel consumption for Poland until 2022 by using Brown's model. Source: own elaboration.

Forecasts below 9 million tonnes of semi-products consumed per year were also obtained in such models: Brown's double exponential smoothing (linear) and Brown's triple exponential smoothing (quadratic). For finished steel production, the forecasts were 13.4 million tonnes. In exponential-autoregency models, the annual forecast of steel consumption for semi-products in Poland also oscillated around 9 million tonnes or slightly above this amount, and for finished steel product: about 13.2 million tonnes. The results for exponential autoregressive models are presented in Figure 7.
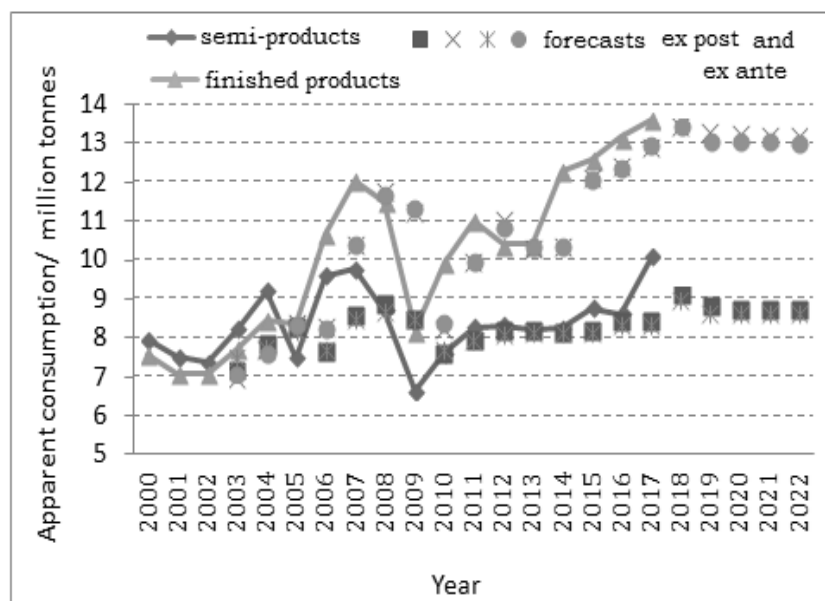
Figure 7. Forecasts of steel consumption for Poland until 2022 by using exponential autoregressive models (for different k: k = 2; k = 3). Source: own elaboration.

Good forecasts were also obtained for Holt's models: Holt's linear trend model with an additive trend and different start point (S1). The forecasted amounts of apparent consumption for semi-products amounted to 10.2 million tonnes on average per year, and for finished steel products, 16.1 million tonnes (average quantity for five years). The results are presented in Figure 8. For Holt's linear trend model with a multiplicative trend, the obtained forecasts were similar to forecasts for the linear trend model with an additive trend (when we compare these forecasts, we can say that forecasts for the additive trend were more optimal). After applying the trend quenching algorithm, forecasts with slightly lower or slightly higher values were obtained. In Holt's quadratic trend models with an additive formula for different start point (S1), the obtained forecasts were similar to forecasts for Holt's other models.
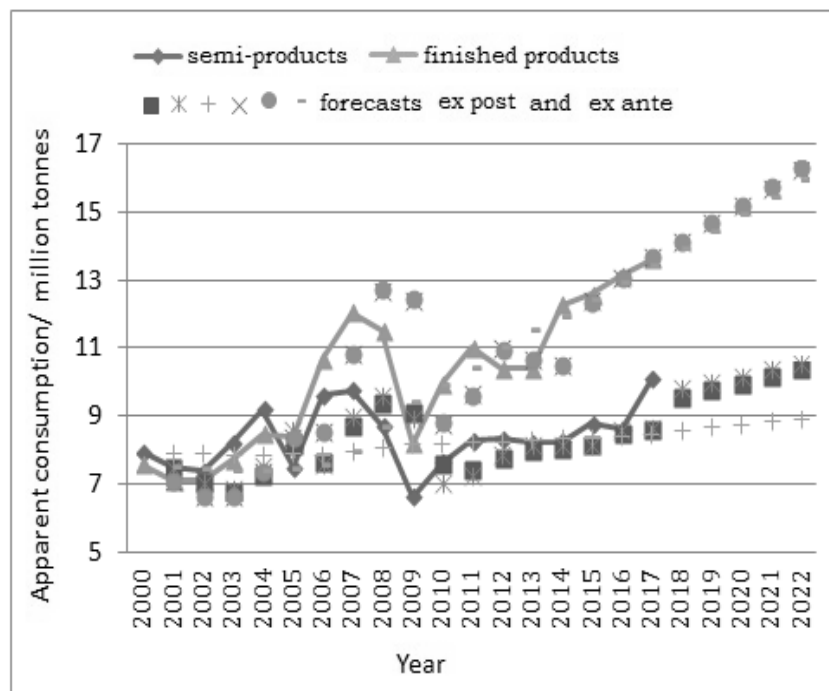
Figure 8. Forecasts of steel consumption for Poland until 2022 by using Holt's linear trend model with an additive trend (for different S_1: $S_1 = y_2 - y_1$; $S_1 = 0$). Source: own elaboration.

Good fit forecasts for steel crude (semi products) (estimation Ψ) were obtained when the advanced exponential-autoregressive model was used for forecasting ($\Psi = 8.4$ %), but such a good fit was not obtained for finished steel products ($\Psi > 10\%$). The following forecasts were obtained for semi-products: 9.237 (2018 year); 9.644 (2019); 10.051 (2020); 10.458 (2021); 10.865 (2022); for finished products: 14.100 (2018); 15.380 (2019); 16.660 (2020); 17.940 (2021); 19.220 (2022). However, using this model, it can be assumed that steel consumption in Poland in the coming years will grow faster than in the forecasts obtained using the Brown's models and Holt's model.

4.3. Creep trend models

The creeping trend method consists in smoothing the value of the trend determined on the basis of a time series using a constant (l) – all linear trends are determined on the basis of l adjacent consecutive time series observation. On the basis of theoretical values determined from linear regression, smoothed forecast values are then calculated (arithmetic means from the theoretical determined values for a given moment t). To obtain steel consumption forecasts, creep trend methods and harmonic weights methods were used (Z. Hellwig's method, 1967). Using this model in one and the other phenomenon studied, the best fit was obtained. The following forecast errors were obtained for semi-finished product forecasts: $\Psi = 4\%$, $q_{t=2018} = (+)\ 0.076$ million tonnes, and for finished products: $\Psi = 3.7\%$, $q_{t=2018} = (-)\ 0.847$ million tonnes. The average annual estimated apparent consumption of crude steel for Poland is 10.8 million tonnes (10.787 million tonnes), and the average annual forecast apparent consumption of final products is 15 million tonnes (14.942 million tonnes). The results of the analysis are presented in Figures 9 and 10.
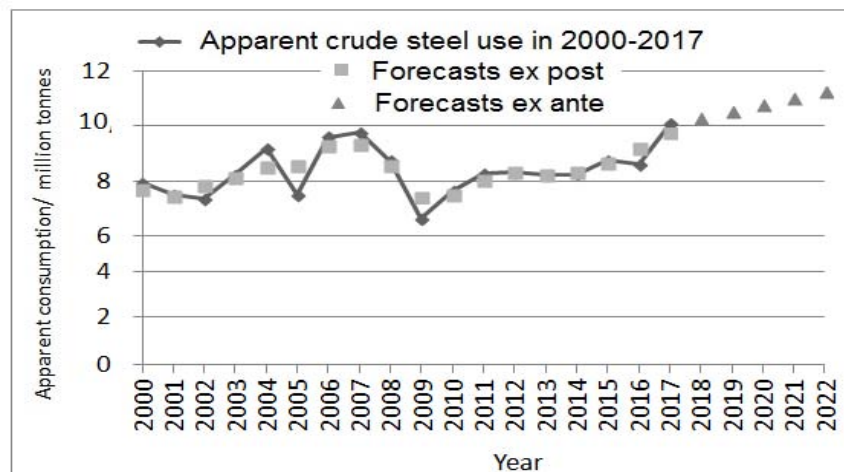
Figure 9. Forecasts of consumption of semi-products for Poland until 2022 by creep trend and harmonic weights methods. Source: own elaboration.
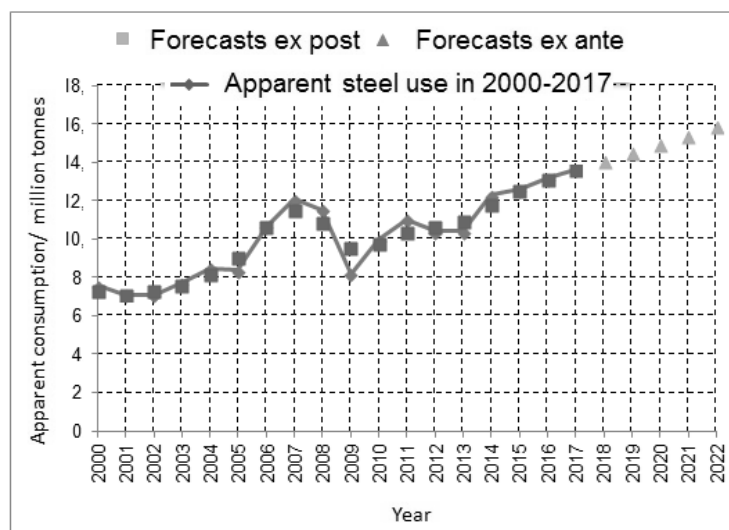
Figure 10. Forecasts of consumption of finished steel products for Poland until 2022 by creep trend and harmonic weights methods. Source: own elaboration.

5. Scenarios for steel consumption

The scenario is the result of a prognostic methodology. The scenario method consists in the construction of several variants of the future scenarios, i.e. constructing a logical, supposed description of events that may occur in the future. Scenarios allow you to define the right goals and prepare the right strategies (Gajdzik, 2017). The essence of the scenario method is to conduct systematic studies of the future of a company and its surroundings, which allow one to identify a possible hypothetical sequence of events leading to various probable effects. This scenario is a very simplistic but possible, hypothetical picture of the future. A favourable sequence of events that may occur will result in the completion of a particular scenario image of the future (Chermack et al., 2001). Scenarios are a form of transition from forecasting to planning. "The task of planning is to choose among the possible trajectories of the system one that is most desirable in light of the analysis of the demand for funds for its implementation and the means that the system can have in the given period for the purpose". The action plan as feasible, satisfies the probability (Rue and Holland, 1986). As a result of prognostic-scenario analysis, there are scenarios of the future which represent a comprehensive, hypothetical vision of the future of a company, including the selected segments of the environment. You can distinguish the following scenarios of the future:

- *base-case scenario*, describing the most likely situation,
- *worst-case scenario* or *best-case scenario*, which represent projections of the worst- and best-anticipated situation.

Average-case scenarios, as well as intermediate values between the baseline and extreme scenarios, are also often taken into account (Bensoussan, and Fleisher, 2010).

On the basis of the following scenarios, forecasts for apparent steel use in the coming years are offered:

- *base-case scenario* for a trend with growth and with steel consumption similar in quantity to average annual steel consumption in 2000-2017 but slightly higher, i.e. for semi-products about 8.6 million tonnes yearly, and for finished steel products about 13.3 million tonnes yearly; a greater increase in positive quantity consumed steel is expected for finished steel products than for semi-products (demand for finished steel products is higher than for semi-finished steel products),
- *worst-case scenario* for a trend with a decrease with steel consumption below the amount of steel consumed on average annually in 2000-2017, i.e. for semi-products below 8.4 million tonnes yearly, and for finished steel production below 10.1 million tonnes yearly (forecasts below the given average annual values were obtained sporadically for a given single year in the forecast period),

- *best-case scenario* for a trend with strong growth of steel consumption for crude steel and semi-products above 9 million tonnes yearly, and for finished steel products above 13 million tonnes yearly (in the first years), and from 15 to 16 million tonnes in 2022.

6. Conclusions

Based on the analysis of development trends of the models of apparent consumption of steel in Poland in 2000-2017 and the estimated forecasts of apparent consumption of steel until 2022, the following conclusions were drawn:

- the trend of apparent consumption of steel is not a linear function; there is a decrease or increase in demand for steel in the economy in specific periods,
- average annual apparent consumption of crude steel in Poland in 2000-2017 was 8.362 million tonnes, and average annual apparent consumption of steel products was 10.118 million tonnes,
- in many used forecasting models, forecasts of apparent consumption of crude steel for Poland did not exceed a level of 9 million tonnes yearly until 2022, but forecasts of apparent consumption of finished steel products were higher in particular models: 13 million tonnes yearly and more,
- projections at a level lower than 9 million tonnes of crude steel consumed annually can be considered as the baseline scenario for the Polish steel industry, and projections at a level lower than 13 million tonnes of finished steel products consumed annually can be considered as the baseline scenario for the Polish steel industry,
- development trends of apparent consumption of finished steel products is characterised by higher growth than apparent consumption of semi-products, which indicates the development of the steel market in Poland.

Optimistic scenarios of steel consumption in Poland should be analysed together with the level of utilisation of production capacity in the industry – such analysis will be carried out by the author of the paper in further research.

References

1. Bensoussan, B., Fleisher, C.S. (2010). *Financial Times Guide to Analysis for Managers: Effective Planning Tools & Techniques.* Harlow: Prentice-Hall.
2. Bostan, I., Onofrei, M. (2012). The economic analysis of the evolution of Romanian ferrous metallurgy. *Metalurgija, 4(51),* 518-550.

3. Chermack, T.J., Lynham, S.A., and Ruona, W.E.A. (2001). A Review of Scenario Planning Literature. *Futures Research Quarterly*, *17(2),* 7-31.

4. Gajdzik, B. (2012). *Restrukturyzacja przedsiębiorstw w warunkach destabilizacji otoczenia na przykładzie branży hutniczej*. Warszawa: Difin.

5. Gajdzik, B. (2013). Changes of action strategies in metallurgical enterprises in time of economic crisis. *Metalurgija, 5(52),* 569-572.

6. Gajdzik, B. (2017). The predictive scenario analysis in a business model: Variants of possible steel production trajectories and efficiency in Poland. In: M. Jabłoński (ed.), *Strategic performance management. Management science – theory and applications. New concepts and contermproray trends* (pp. 235-252). New York: Nova Science Publishers, Inc., Chapter 15.

7. Gajdzik, B. (2018). *Porestrukturyzacyjne modele funkcji produkcji dla przemysłu hutniczego z prognozami i scenariuszami zmian w wielkości produkcji stali*. Gliwice: Wydawnictwo Politechniki Śląskiej.

8. Gajdzik, B., Gawlik, R., Skoczypiec, S. (2018). Forecasting-Scenario-Heuristic method proposal for assessment of feasibility of steel production scenarios in Poland – Managerial implications for production engineering. *Archives of Civil and Mechanical Engineering, 18,* 1651.

9. *Indirect trade in steel. Definitions, methodology and applications* (April, 2012). World Steel Association (worldsteel). Accessed: www.worldsteel.org.

10. Kardas, M., Szulc, W. (2010). Restrukturyzacja sektora stalowego w Polsce. *Prace IMŻ Gliwice, 1,* 220-227.

11. Krawiec, S, (2014). *Adaptacyjne modele wygładzania wykładniczego jako instrument prognozowania krótkoterminowego zjawisk ilościowych*. Gliwice: The Silesian Univeristy of Technology.

12. Manikowski, A., Tarapata, Z. (2002). *Prognozowanie i Symulacja Rozwoju Przedsiębiorstw* [Foresight and simulation of development of enterprises]. Warsaw: Druktur.

13. Morariu, A., Bostan, I. (2012). Trends in personal and productivity associated with the steel industry in the Romanian economy. *Metalurgija, (51)4,* 551-554.

14. Pawłowski, Z. (1980). Statystyka matematyczna. Warszawa: PWN.

15. Pelikán, E. (1999). Principles of Forecasting — A Short Overview. SOFSEM'99: Theory and Practice of Informatics, Proceedings of SOFSEM 1999 Conference, Milovy, Czech Republic, November 27-December 4. In: J. Pavelka, G. Tel, M. Bartosek (Eds.), *Lecture Notes in Computer Science, 1725*. Berlin: Springer-Verlag, 311-327.

16. Polish steel industry – report (2018). Katowice: Polish Steel Association, 20.

17. Rębiasz, B. (2003). Analiza stalochłonności PKB w Polsce w latach 1992-2001. *Gospodarka Materiałowa i Logistyka, 1,* 15-18.

18. Rębiasz, B., Garbarz, B., Szulc, W. (2004). Wpływ dynamiki i struktury rozwoju gospodarczego Polski na krajowe zużycie stalowych wyrobów hutniczych. *Hutnik-Wiadomości Hutnicze, 9(71),* 454-458.

19. Rue, L.W., Holland, P.G. (1986). *Strategic Management. Concepts and Experiences*. New York: McGraw-Hill Inc., 430-432.

20. *Steel Statistical Yearbook 2017.* World Steel Association. Available online: www.worldsteel.org/internet-2017/steel-by-topic/statistics/steel-statistical-yearbook-.html, 5 December 2017.

21. Szkutnik, W., Balcerowicz-Szkutnik, M. (2006). *Wstęp do metod ekonometrycznych. Metody i zadania*. Katowice: Wyższa Szkoła Zarządzania im. gen. Jerzego Ziętka.

22. Szulc, W. (2014). *Transformacja polskiego hutnictwa do gospodarki wolnorynkowej*. Prace Instytutu Metalurgii Żelaza. Gliwice.

23. Szulc, W., Garbarz, B., Paduch, J. (2011). Przebieg i wyniki restrukturyzacji sektora stalowego w Polsce. *Prace IMŻ w Gliwicach, 4,* 40-51.

24. *The impact of the European steel industry on the EU economy* (February, 2018). Eurofer & Oxford Economics, www.eurofer.be.

25. *The Role of Steel Manufacturing in the Global Economy* (May, 2019). Worldsteel & Oxford Economics, www.worldsteel.org.

A COMPANY'S PROACTIVE MARKETING ORIENTATION
IN THE HIGH-TECH SECTOR

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Abstract: This paper links the characteristics of new product development in the high-tech sector with the marketing orientation of the firm, especially in its proactive form. The purpose of the paper is to define the characteristics of competition and innovation creation in the high-tech B2C sector and assess whether the marketing orientation of the enterprise may be an answer to those characteristics. Creating innovation in the high-tech sector is difficult due to technological and market (consumer) uncertainty, as well as competitive volatility. This significantly increases the risk of market failure of new products, especially in the case of radical innovations. The way firms may counteract this risk is to adopt a market orientation. Particularly important is its proactive dimension, which involves researching and anticipating future and latent consumer needs. Firms developing new products in the high-tech sector should pursue the proactive marketing orientation and consequently focus on the latent and future consumer needs. Methods stemming from future studies and foresight might be useful in achieving this goal. The methodology used in the paper was the selective literature review in the area of new product development in the high technology sector and marketing orientation of the firm.

Keywords: new product development, high-tech sector, marketing orientation, consumer orientation.

1. Introduction

Most innovations are created in the high-tech sector. The process of their creation is characterised by specific conditions, as is the character of competing in this sector. High technologies mean the newest, most advanced technologies, which e.g. include robotics, nanotechnology or aviation technologies. High-tech companies "are involved in the design, development and marketing of new products and/or innovative production processes through the systematic application of scientific and technical knowledge" (Hecker, 2005, pp. 57-72). Research and development (R&D) departments play a key role in these companies, allowing them to create radical product innovations in opposition to imitative innovations, which are more common in other industries (OECD, 2005, p. 37).

Mick and Fournier point out that high technologies create a paradox for consumers, because they generate both positive and negative emotions that can lead to conflict and fear (1998). Therefore, one cannot be sure of the adoption of technologically innovative products by consumers. This may indicate the need for the company to adopt a marketing orientation.

The purpose of this selective literature review is to define the characteristics of competition and innovation creation in the high-tech B2C sector and to evaluate whether the marketing orientation of an enterprise may be an answer to these characteristics, and if so, then how?

2. Methods

This paper is a selective literature review in the area of new product development in the high technology sector and the marketing orientation of a firm. A selective approach was chosen due to the aim of this study. The following databases were searched: Emerald, ProQuest, Wiley Online Library, Taylor & Francis and ScienceDirect, as well as Google and Google Scholar. The following phrases were used: "high-tech sector characteristics", "high-tech competition", "marketing orientation", "consumer uncertainty". In order to obtain more relevant publications, the search concentrated on specific criteria: language – English or Polish, refined by categories – management or economics or business, timespan – 1980-2020. Publications which focused on the characteristics of competing in the high-tech B2C (business-to-consumer) sector and proactive and responsive marketing orientation in this sector were selected.

3. The characteristics of competing in the high-tech sector

The consumer goods market in high-tech industries is one of the most dynamically developing in the world (Wiechoczek, 2016, p. 231). High-tech industries are characterised by special features that make competing particularly demanding, although potentially very profitable. The specificity of the high-tech sector consists primarily of volatility and multidimensional uncertainty among enterprises and consumers.

3.1. High-tech sector volatility

The competitive volatility of the high technology sector means that companies cannot be sure with whom (the variability of competition), with which products (the variability of the subject of competition) and with what methods (variability of the business strategy) they will compete against even in the near future (Mohr, Sengupta, and Slater 2010, p. 11).

Among others, this is a result of the convergence - the linking of various technology industries. An example is the smartphone, which is the successor to a traditional mobile phone, which unexpectedly became dangerous competition for portable game consoles. Moreover, rivals from other industries are often more unpredictable in introducing new business models. An example is the introduction of Skype, which allows one to make free Internet calls around the world, which surprised rivals basing their income on long-distance calls.

3.2. Firms' uncertainty in the high-tech sector

There is uncertainty on the side of entrepreneurs as to the time needed to introduce technologically advanced products to the market (Mohr, Sengupta and Slater, 2010, pp. 14-15). The time it takes to achieve this is usually longer than for other products. Postponing the market premiere of a product has a negative impact on the satisfaction of the consumers, who can opt for a product offered by competitors. Furthermore, due to technological developments, neither the producer nor the consumer can be certain how long a given technology will remain in use and when it will become obsolete. Moreover, the market for advanced technologies is often regulated by the government and international organisations, which further increases the uncertainty of doing business (Viardot, 2004, pp. 21-23). In order to remain competitive in the high-tech sector, a constant ability to introduce innovations is necessary as a consequence of a shorter product life cycle. For example, Moore's (Intel's founder) law says that processor performance doubles every 18 months without raising the prices (Moore, 1965). To maintain this pace, it is necessary to conduct continuous, intensive research. The associated high expenditure on R&D is another feature of this sector, in which the automotive industry excels (Viardot, 2004, pp. 17-19). The development of the high-tech sector is also affected by the phenomenon of knowledge spillover. This means that technological advances in one area influence other branches. Therefore, companies should carefully monitor the state of knowledge not only in their industry, but also in others. Another phenomenon is the merger of technologies, i.e. combining previously different areas of technical knowledge, which increases the uncertainty of this sector. An example is the success of NEC, whose president predicted a merger of the IT sector with telecommunications (Klincewicz, 2016, p. 116). Technological uncertainty is also increasing, as many high-technology products incorporate not one technology, but several technologies (Dhebar, 2016).

The high-tech sector is particularly susceptible to the network effect, meaning that the more popular a given product or service is, the greater its value for consumers (Hirynyawipada, and Paswan, 2006, p. 187). A direct network effect occurs when the value of a product or service increases with the number of users, as exemplified by the telephone in the first half of the 20th century (Fisher, and Oberholzer-Gee, 2013, p. 162). If the market was not sufficiently saturated with this once technologically advanced device, it would prove to be not very useful for its initial buyers. In turn, the indirect network effect is based on complementary goods that increase the value of the basic product and vice versa. A computer with software is a good

example. The network effect is associated with the need to follow market standards, e.g. in the field of interfaces. The increase in product compatibility with other consumer devices increases its perceived value. Table 1. shows industries ranked by the level of uncertainty. Apart from agriculture, all of them belong to the high-tech sector.

Table 1.
Industries ranked by the level of uncertainty

	INDUSTRY	R&D OF SALES	REVENUE VOLATILITY	FIRM TURNOVER
1	Medical equipment	8.2%	90.7%	13.1%
2	Computers	5.8	98.8	12.0
3	Computer software	9.8	69.9	14.4
4	Pharmaceutical products	17.4	63.3	12.7
5	Measuring & control equip.	9.3	97.0	8.8
6	Machinery	3.2	100.5	9.3
7	Agriculture	10.8	123.3	4.9
8	Electronic equipment	5.2	61.5	10.5
9	Chemicals	3.0	71.2	9.2
10	Electrical equipment	9.8	35.0	9.2

Source: Dyer et al., 2014.

3.3. Consumer uncertainty in the high-tech sector

The market uncertainty of the high technology sector is manifested as uncertainty about a product's value for the consumer, as well as a consumer's future needs. The rate at which the technology spreads is unknown, as well as is the associated difficulty in assessing the size of the market (Moriarty, and Kosnik, 1989, p. 8). Kline and Rosenberg point out that the more innovative a new product is and the more significant changes it introduces, the greater the uncertainty associated with it (1986, p. 276). The sources of uncertainty can also be divided according to economic (e.g. income), socio-demographic (e.g. age, gender and education), cultural (e.g. religion) and psychological (e.g. personality) consumer factors (Tkaczyk, and Awdziej, 2009).

Technological uncertainty in the high-tech market encapsulates, among others, uncertainty as to whether an innovative product will work properly and, as a result, if it will meet the consumer's expectations (Mohr, Sengupta, and Slater, 2010, pp. 14-15). Moreover, in the case of technologically advanced products, there is a widespread belief that there is a greater risk of failure, which may raise concerns regarding the possibility and cost of repairs. Consumers may also wonder if such a product will act as promised by the manufacturer, for example in terms of its usability, performance and reliability (Sarin, Sego, and Chanvarasuth, 2003, pp. 71-72). It is the functional dimension of the uncertainty that has a particularly negative impact on the intention to adopt products from the high-tech sector (Ziamou, and Ratneshwar, 2002, pp. 341-342). Consumers may also be concerned about their ability to use a technologically advanced product, as well as about the uncertainty related to the lack of understanding of the mechanism of its operation. This is becoming more and more common nowadays, as the number of new

technologies and their complexity is growing rapidly (Philips, and Hallman, 2013, pp. 741-742). Technology literacy and especially IT literacy play a role in the degree of technological uncertainty. However, even for tech savvy consumers, the principle of a high-tech product's operation may not be presumed due to the protection of the intellectual property of the company (Hall, Bachor, and Matos, 2014, p. 413). In addition, features such as durability and reliability are revealed only in the process of use, and they are consequently difficult to evaluate before buying. The consumer may, therefore, be worried about whether such a technologically complex product will break down and whether, in the event of a failure, it can be easily repaired, and if so, whether such repairs will be quick and inexpensive. Another key issue is the fear of the physical consequences of a possible malfunction.

The magnitude of consumer uncertainty depends on the high-tech product. The more consumers have experience in using a particular product, the less risk is perceived (Frąckiewicz, 2009, p. 222). Naturally, for new types of high-tech products, there is very little chance that consumers have any experience in their use. Moreover, consumers may be uncertain as to which consumer needs the given technology fulfils (Mohr, Sengupta, and Slater, 2010, pp. 12-13). Another issue is the short lifespan of technologically advanced products, which, combined with the high purchase price and rapid depreciation of value, increases the purchase risk perceived by the consumer. In addition, consumer needs are changing, which, combined with the desire to have the latest products, increases the risk of purchase. Consumers also face the risk that their product will be replaced by another technological market standard (Sarin, Sego, and Chanvarasuth, 2003, p. 72). For example, in 2007, two different types of high definition DVD players were introduced to the market: Sony Blu-Ray and Toshiba HD-DVD. The movie purchased by the consumer could only be compatible with one of these two types of players. Consumers' doubts as to which of these formats would become dominant effectively discouraged them from making purchase decisions, which resulted in a significant slowdown of the diffusion rate of these technologies (Mohr, Sengupta, and Slater, 2010, p. 12). Ultimately, the Blu-Ray format displaced HD-DVD, and customers who chose the latter player had to reconcile with the fact that from 2008, they were not able to watch new films on their device. Therefore, industrial standards play a role in either reducing consumer risk (when they are introduced) or increasing consumer risk (when they are lacking). All in all, due to such the large and multidimensional role of uncertainty in the high-tech sector, all actions aimed at reducing this are of particular importance.

Most companies offering technologically advanced products have a marketing communication strategy aimed at increasing the acceptance of their products by decreasing the associated risks (Philips, and Hallman, 2013, p. 739). Enterprises use various strategies to reduce perceived technological risk. An example is offering products as part of a bundle, which includes products considered safe (because of a known brand or popularity) and products considered risky due to unknown, advanced technology (Sarin, Sego, and Chanvarasuth, 2003). Manufacturers can also take a number of formal and legal measures to reduce the risk perceived

by the consumer. These include, for example, the manufacturer's legal liability for damages caused by the product (product liability), granting the right to return the product or providing a guarantee (Taranko, and de Pourbaix, 2009, p. 184). Furthermore, in the case of applied artificial intelligence, such as medical assistive devices (IBM's Watson, Fraunher IPA's Care-O-bot 3, AiCure) and autonomous vehicles (BMW, Daimler, Deutsche Bahn), trust in the manufacturer (of both hardware and software) is especially important in reducing the consumer's uncertainty (Hengstler et al., 2016).

4. Proactive and responsive marketing orientation in the high-tech sector

Initially, competition in the high-tech sector was mainly based on the fast and simultaneous introduction of radical and incremental innovations (Mohr, Sengupta, and Slater, 2010). At present, however, this approach is no longer sufficient due to hypercompetition (D'Aveni, 1997). Companies are forced to seek sources of competitive advantage elsewhere, in particular in marketing activity (Wiechoczek, 2016, p. 231). The marketing orientation of high-tech enterprises results in better new product performance, as well as the overall higher effectiveness of the company (Im and Workman, 2004). Marketing orientation means collecting, sharing and using market information (about consumers, consumer trends or competition) in order to make better strategic decisions, including the process of developing a new product (Mohr, Sengupta, and Slater, 2010, p. 4). Marketing orientation allows for the reduction of uncertainty for a company. This approach underlines that it is important to develop products tailored to the specific expectations of customers. This is possible thanks to the enterprise's understanding of the clients' needs, with whom it maintains relations in order to determine the core values that will be expected in the future (Wiśniewski, 2016, p. 325).

The process of developing a new product is usually divided into the following stages: idea search, evaluation and selection of ideas, concept development and testing, marketing strategy preparation, business analysis, product development, market tests and commercialisation. According to Armstrong and Kotler, customers play a key role in searching for an idea, and they are the most important source for this (2012, p. 363). The cited authors note, however, that, especially in the case of technologically advanced products, companies cannot be limited to the needs of consumers, and sources of ideas for innovation should be diverse. Wiechoczek (2015) also draws attention to the limited role of consumers as a source of ideas for innovations in the high technology sector.

However, at other stages, such as concept testing or market testing, consumer participation is essential. The results of empirical research indicate that consumer-focused marketing orientation is conducive to the creation of radical, novel innovations (Lukas, and Ferrell, 2000). Thus, less imitative innovations are created ("me-too innovation"). However, in the case of

enterprises focused more on researching the activities of competition, this relationship is inverse. This underlines the importance of research on the determinants of the acceptance of innovations by consumers.

Consumers are becoming a more important innovation resource (Tidd, and Schweitzer, 2018). Companies must decide whether to concentrate on existing customers and markets or on new customers and markets (Lamore, Berkowitz, and Farrington, 2013). Marketing orientation can be divided into responsive and proactive (Narver, Slater, and MacLachlan, 2004). In the case of the former, the company primarily focuses on current consumers and their existing, expressed needs. Responsive orientation is also characterised as being market demand driven, meaning that the marketing department identifies new product opportunities and communicates with R&D to develop innovative solutions to expressed customer needs (Lamore, Berkowitz, and Farrington, 2013). However, this strategy has disadvantages, including a limitation of innovation. That is why Mohr, Sengupta and Slater are in favour of a proactive marketing orientation, which is based on attempts to predict and meet the latent and future needs of consumers (2010, p. 107). This is regarded as invention driven, meaning that the R&D departments search for innovative solutions. When latent needs are not met by consumers, there is no sign of dissatisfaction or any other response. However, when a company manages to discover such a need and satisfy this, it often gains a loyal customer.

Despite the above, in the case of radical innovations, the cooperation between the R&D department and the marketing department is particularly important – even at the initial stages of product development. This is due to the fact that the applications of a new technology may be too numerous or unexpected by the consumer (Mohr, Sengupta, and Slater, 2010, p. 122). Jointly defining the industry and the market in which the product will compete and setting expectations and priorities increase the chances of success in sales. The findings of empirical research confirm that new products of enterprises in which the marketing and R&D departments work closely together more often achieve success (Mohr, Sengupta, and Slater, 2010, p. 121). Lamore, Berkowitz and Farrington (2013) showed that a high degree of synergy is developed between the R&D and marketing department when the focus is on future market needs. Proactive market orientation exhibits a positive relationship with market performance, while responsive market orientation does not. Moreover, responsive customer orientation diminishes the ability to reduce product-related uncertainties at the fuzzy front end of innovation (meaning the early stages of innovation creation) (Schweitzer et al., 2018).

Some studies reach for even more detailed methods of analysis. For example, Im and Workman divided the aspect of product innovation in the high-tech sector into its novelty and relevance (2004, p. 115). Novelty is measured as the degree to which new products are unique and different from the competition, and relevance – as the degree to which they are seen as impactful and useful to consumers. The results show that if a company cooperates closely with consumers during product development, relevant products are more often created. However, when a company focuses on observing competition as part of its marketing orientation, it more

often creates novel products. It also turns out that the commercial significance of the product is related more to the relevance dimension, which confirms the importance of consumer research of products at the research and development stage (Im, and Workman, 2004, p. 127).

Narver et al. (2004) hypothesised that both forms of market orientation would be positively linked with the success of a new product, with proactive market orientation exhibiting a greater impact. Their results show that proactive market orientation indeed exhibited a positive relationship, while responsive market orientation exhibited a negative relationship with the success of a new product. Moreover, the creation of gradual innovations is helped by responsive marketing orientation, while the formation of radical innovations – proactive marketing orientation (Atuahene-Gima, Slater, and Olson, 2005). In addition, a proactive strategy can lead to a market structure redefined by value innovation and by creating a "blue ocean" where there is no competition at all (Chan Kim, and Mauborgne, 2005). Such attempts are generally very risky, which is why a proactive marketing orientation allows for a reduction of the increased risk. The actions that lead to this are primarily market research on future, non-existent products, observation of consumer habits or cooperation with active users (Sundbo, 1998, p. 152; Mohr, Sengupta, and Slater, 2010, p. 107). This allows for the creation of products with the features and functionalities desired by consumers.

Different views are also present in literature. Von Hippel states that the average user of today's products has no experience with the products of the future (1984). Goldenberg and Mazursky believe that consumer research is an effective method to learn about product strengths and weaknesses, match new products to customer needs or forecast product success and sales, but it is no longer a source of ideas for future radical product innovations (2005, pp. 14-15). This stays in accordance with the findings that the role of the marketing department (responsible for understanding the needs of customers) is increasing along with the time left to the market debut of a new product (Mohr, Sengupta, and Slater, 2010, p. 122). In addition, many ground-breaking innovations are initiated under the supply-push innovation model (Markides, 2006, pp. 22-23).

5. Future research

This paper has linked the characteristics of innovation creation in the high-tech industry with the marketing orientation of a firm, pointing out the usefulness of proactive marketing orientation. Nevertheless, there still exists a need to reconfirm such a causal connection, as existing research is scarce.

Moreover, there are still many other unanswered questions. For example, one could research if there are particular high-tech industries which benefit more from a proactive orientation. Another question arises – are there particular high-tech industries which possibly benefit,

differently than the majority of the high-tech sector, from a passive marketing orientation? If yes, why is this?

Furthermore, if proactive marketing orientation focuses on future and latent consumer needs, is an invention push coming solely from the R&D department really sufficient? There are ways of studying both latent and future consumer needs. For example, latent attitudes can be measured by the Implicit Association Test (Maison, 2004). When it comes to future attitudes, there is a wide array of methods stemming from future studies and strategic foresight, which may allow one to predict the possible future and latent needs of consumers. These are e.g. the scenario method, Delphi method (e.g. Merfeld et al., 2019) or trend analysis. Other methods, such as studying consumers' technology acceptance of as yet non-existing products, strategic workshops, co-designing (Mencarini et al., 2019) and design thinking methods (e.g. Micheli et al., 2019) may also be helpful. Another source of information is Big Data, which, paired with data science, allows one to gain deep insight into consumer attitudes and behaviour (Erevelles et al., 2016). Therefore, exploring the popularity of these methods for new product development in the high-tech sector, as well as the relation of their introduction with the success of a new product, is suggested.

6. Summary

The technological advancement of a product is not in itself desirable by the market (Kline, and Rosenberg, 1986, p. 278). The value of a product for a consumer is created by the difference between advantages and cost (Viardot, 2004, pp. 5-6). In addition, the significant role of cooperation in developing innovations (especially radical ones) between the marketing department and the R&D department should be emphasised. Unexpectedly, the importance of this cooperation rises with the increase in the degree of advancement of innovation and uncertainty of the environment (Mohr, Sengupta, Slater, 2010, p. 122).

Creating innovation in the high-tech sector is also difficult due to technological and market uncertainty, as well as competitive volatility. This significantly increases the risk of market failure, especially in the case of radical innovations. The way to counteract this risk may be to adopt a market orientation, as it allows one to reduce the sector's uncertainty. Particularly important is its proactive dimension, which involves researching and anticipating future and latent consumer needs, as well as in the context of new innovative products that are under development. This assumes cooperation with consumers, including research on consumer attitudes towards an innovative product already at the stage of its development, i.e. before it reaches the market. While proactive market orientation exhibits a positive relationship with market performance, responsive market orientation does not. Moreover, responsive customer

orientation diminishes the ability to reduce product-related uncertainties at the early stages of innovation creation.

Novel directions of future research are indicated, and among them are methods aimed at lowering uncertainty: the scenario method, Delphi method, trend analysis, studying consumers' technology acceptance of as yet non-existing products, strategic workshops, co-designing, design thinking methods, as well Big Data analysis.

References

1. Tidd, J., Schweitzer, F. (2018). Innovation heroes: Understanding customers as a valuable innovation resource. In: J. Tidd, J.R. Bessant (eds.), *Managing Innovation. Integrating Technological, Market and Organizational Change*, 1-295. https://doi.org/10.1142/q0158.
2. Dhebar, A. (2016). Bringing new high-technology products to market: Six perils awaiting marketers. *Business Horizons*, *59(6),* 713-722.
3. Mencarini, E., Leonardi, C., Cappelletti, A., Giovanelli, D., De Angeli, A., & Zancanaro, M. (2019). Co-designing wearable devices for sports: The case study of sport climbing. *International Journal of Human Computer Studies*, *124(July 2018),* 26-43. https://doi.org/10.1016/j.ijhcs.2018.10.005.
4. Schweitzer, F., Palmié, M., & Gassmann, O. (2018). Beyond listening: the distinct effects of proactive versus responsive customer orientation on the reduction of uncertainties at the fuzzy front end of innovation. *R&D Management, 48(5),* 534-551. https://doi.org/10.1111/radm.12252.
5. Armstrong, G., Kotler, P. (2012). *Marketing. Wprowadzenie.* Warszawa: Pearson Education Inc.
6. Atuahene-Gima, K., Slater, S.F., and Olson, E.M. (2005). The Contingent Value of Responsive and Proactive Market Orientations for New Product Program Performance, *Journal of Product Innovation Management, 22,* 464-482.
7. Chan Kim, W., and Mauborgne, R. (2005). *Strategia błękitnego oceanu: jak stworzyć wolną przestrzeń rynkową i sprawić, by konkurencja stała się nieistotna.* Warszawa: Wydawnictwo MT Biznes.
8. D'Aveni, R.A., and Gunther, R.E. (1994). *Hypercompetition: Managing the dynamics of strategic maneuvering.* New York: The Free Press.
9. Dyer, J., Furr, N., Lefrandt, C. (2014). The industries plagued by most the most uncertainty. *Harvard Business Review*, hbr.org.
10. Erevelles, S., Fukawa, N., & Swayne, L. (2016). Big Data consumer analytics and the transformation of marketing. *Journal of Business Research*, *69(2),* 897-904. https://doi.org/10.1016/j.jbusres.2015.07.001.

11. Fisher, W.W., and Oberholzer-Gee, F. (2013). Strategic Management of Intellectual Property: An Integrated Approach, *California Management Review*, *55(4),* 157-184.

12. Frąckiewicz, E. (2009). *Ryzyko cyfrowe nabywcy – pojęcie i znaczenie*. In: L. Garbarski, J. Tkaczyk (eds.), *Kontrowersje wokół marketingu w Polsce. Niepewność i zaufanie a zachowania nabywców* (pp. 220-229). Warszawa: Wydawnictwo Akademickie i Profesjonalne.

13. Goldenberg, J., and Mazursky, D. (2002). *Creativity in product innovation*. Cambridge: Cambridge University Press.

14. Hall, J., Bachor, V., and Matos, S. (2014). The impact of stakeholder heterogeneity on risk perceptions in technological innovation. *Technovation*, *34(8),* 410-419. http://doi.org/ 10.1016/j.technovation.2013.12.002.

15. Hecker, D.E. (2005). High-technology employment: NCAIS based update. *Monthly Labor Review, June*.

16. Hengstler, M., Enkel, E., & Duelli, S. (2016). Applied artificial intelligence and trust – The case of autonomous vehicles and medical assistance devices. *Technological Forecasting and Social Change*, *105*, 105-120. https://doi.org/10.1016/j.techfore. 2015.12.014.

17. Hirunyawipada, T., and Paswan, K. (2006). Consumer innovativeness and perceived risk: Implications for high technology product adoption. *Journal of Consumer Marketing*, *23(4),* 182-198. http://doi.org/10.1108/07363760610674310.

18. https://doi.org/10.1016/j.bushor.2016.08.006.

19. Im, S., and Workman, J.P. (2004). Market Orientation, Creativity, and New Product Performance in High-Technology Firms A. *Journal of Marketing*, *68*, 114-132. http://doi.org/10.1509/jmkg.68.2.114.2778.

20. Klincewicz, K. (2016). Zarządzanie technologiami – perspektywa organizacji-użytkownika. In: K. Klincewicz (ed.), *Zarządzanie, organizacje i organizowanie – przegląd perspektyw teoretycznych* (pp. 110-123), Warszawa: Wydawnictwo Naukowe Wydziału Zarządzania Uniwersytetu Warszawskiego.

21. Kline, S., and Rosenberg, N. (1986). An overview of innovation. In: R. Landau, N. Rosenberg (eds.), *The Positive Sum Strategy. Harnessing Technology for Economic Growth*. Washington: National. Academy Press.

22. Lamore, P.R., Berkowitz, D., and Farrington, P.A. (2013). Proactive/responsive market orientation and marketing – Research and development integration. *Journal of Product Innovation Management*, *30(4),* 695-711. https://doi.org/10.1111/jpim.12024.

23. Lukas, B.A., and Ferrell, O.C. (2000). The effect of product orientation on product innovation, *Journal of the Academy of Marketing Science*, *28(2)*.

24. Maison, D. (2004). *Utajone postawy konsumenckie*. Sopot: GWP.

25. Markides, C. (2006). Disruptive Innovation: In Need of Better Theory. Business-Model Innovation. *Harvard Business Review*, *23*, 19-25. http://doi.org/10.1111/j.1540-5885. 2005.00177.x.

26. Merfeld, K., Wilhelms, M.P., Henkel, S., and Kreutzer, K. (2019). Carsharing with shared autonomous vehicles: Uncovering drivers, barriers and future developments – A four-stage Delphi study. *Technological Forecasting and Social Change, 144(March),* 66-81. https://doi.org/10.1016/j.techfore.2019.03.012.

27. Micheli, P., Wilner, S.J.S., Bhatti, S.H., Mura, M., and Beverland, M.B. (2019). Doing Design Thinking: Conceptual Review, Synthesis, and Research Agenda. *Journal of Product Innovation Management, 36(2),* 124-148. https://doi.org/10.1111/jpim.12466.

28. Mick, D.G., and Fournier, S. (1998). Paradoxes of Technology: Consumer Cognizance, Emotions, and Coping Strategies, *Journal of Consumer Research*, *25(2),* 123-143. doi: 10.1086/209531.

29. Mohr, J., Sengupta, S., and Slater, S. (2010). *Marketing of high-technology products and innovations*. New Jersey: Pearson Education Inc.

30. Moore, G.E. (1965). Cramming More Components Onto Integrated Circuits, Electronics, April 19, 1965. *Electronics*, *38(8),* 82-85.

31. Moriarty, R.T., Kosnik, T.J. (1989). High-tech marketing: concepts, continuity, and change. *MIT Sloan Management Review*, *30(4).*

32. Narver, J.C., Slater, S.F., and MacLachlan, D.L. (2004). Responsive and proactive market orientation and new-product success. *Journal of Product Innovation Management*, *21(5),* 334-347. https://doi.org/10.1111/j.0737-6782.2004.00086.x.

33. Organization for Economic Cooperation and Development and Statistical Office of the European Communities (2005). *The measurement of scientific and technological activities: guidelines for collecting and interpreting innovation. Oslo Manual*. Paris: OECD Publishing.

34. Philips, D., Hallman, W. (2013). Consumer Risk Perceptions and Marketing Strategy: The Case of Genetically Modified Food. *Psychology & Marketing, 30(9),* DOI: 10.1002/ mar.20642.

35. Sarin, S., Sego, T., and Chanvarasuth, N. (2003). Strategic use of bundling for reducing consumers' perceived risk associated with the purchase of new high-tech products. *Journal of Marketing Theory and Practice, 11(3).*

36. Sundbo, J. (1998). *The Theory of Innovation. Entrepreneurs, Technology and Strategy.* Northhampton: Edward Elgar.

37. Taranko, T., de Pourbaix, P. (2009). Niepewność w zachowaniach konsumentów i sposoby jej ograniczenia. In: L. Garbarski, J. Tkaczyk (eds.), *Kontrowersje wokół marketingu w Polsce. Niepewność i zaufanie a zachowania nabywców* (pp. 175-186). Warszawa: Wydawnictwo Akademickie i Profesjonalne.

38. Tkaczyk, J., Awdziej, M. (2009). Istota i kategorie niepewności w odniesieniu do nabywców. In: L. Garbarski, J. Tkaczyk (eds.), *Kontrowersje wokół marketingu w Polsce. Niepewność i zaufanie a zachowania nabywców* (pp. 52-60). Warszawa: Wydawnictwo Akademickie i Profesjonalne.

39. Viardot, E. (2004). *Successful Marketing Strategy for High-Tech Firms*. Boston: Artech House.

40. Von Hippel, E. (1984). Novel Product Concepts from Lead User: Segmenting Users by Experience. *Marketing Science Institute Working Paper*, *Report No. 84-109*.

41. Wiechoczek, J. (2015). Źródła innowacji produktowych w sektorze wytwórców dóbra zaawansowanych technicznie, *Logistyka*, *2*.

42. Wiechoczek, J. (2016). Tendencje w rozwoju marketingu mobilnego producentów dóbr zaawansowanych technologicznie. *Studia Ekonomiczne. Zeszyty Naukowe Uniwersytetu Ekonomicznego w Katowicach, 254*.

43. Wiśniewski, P. (2016). Marketing – relacja wymiany wartości. In: K. Klincewicz (ed.), *Zarządzanie, organizacje i organizowanie – przegląd perspektyw teoretycznych*. Warszawa: Wydawnictwo Naukowe Wydziału Zarządzania Uniwersytetu Warszawskiego.

44. Ziamou, P., and Ratneshwar, S. (2002). Promoting Consumer Adoption of High-Technology Products: Is More Information Always Better? *Journal of Consumer Psychology*, *12(4),* 341-351. http://doi.org/10.1207/S15327663JCP1204_0.

THE RESEARCH OF PROJECT MATURITY IN MINING SERVICE ENTERPRISES IN POLAND

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Abstract: Project maturity is the ability of an organisation to effectively select a project portfolio in such a way that the execution of these projects contributes to the objectives and strategy of the organisation and the ability to apply professional project management techniques and tools in order to achieve high quality project products, repeatability of successes and avoid failure in forthcoming projects. The article presents the results of preliminary survey research aiming to assess the degree of maturity in project management in the scope of methods and tools, human resources, environment and knowledge management. The research was conducted in mining service enterprises in Poland.

Keywords: project management, project maturity, mining service enterprise.

1. Project maturity of an organisation

The maturity of an organisation can be regarded as the organisation's ability to effectively manage projects. The Project Management Institute may also define an organisation's project maturity as the ability to select projects whose implementation leads to the achievement of the organisation's objectives (PMI, 2008). According to the Software Engineering Institute (OGC, 2007), this is the level of development of an organisation in relation to project management or the organisation's willingness to implement projects. An interesting definition is given by J. Schlichter (Wyrozębski, Juchniewicz, Matelski, 2012), treating this concept as the ability of an organisation to identify project success factors and prevent project problems. Therefore, in literature on the subject, the term "project maturity of an organisation" is defined in a number of different ways. Many definitions emphasise the different criteria that an organisation has to meet in order to be defined as mature. This means that the process of

reaching maturity is related to improving skills until they are fully achieved in various dimensions: economic, social or biological (Juchniewicz, 2009).

Kerzner (Kerzner, 2005) defines maturity as "the degree of development of a system and processes that are inherently repetitive and likely to be successful in future projects. However, the repeatability of systems and processes does not guarantee success, but only increases its chances". This signifies that as the level of project maturity increases, the organisation achieves a higher degree of excellence, reflecting its development.

Project maturity is an organisation's ability to effectively select a project portfolio in such a way that the implementation of these projects supports the organisation's objectives and strategy, as well as its ability to use professional project management techniques and tools in order to achieve high quality project products, repeatability of successes and avoid failures in upcoming projects (Juchniewicz, 2012).

Project Management Maturity Models are used to measure an organisation's project maturity. The maturity model is defined as a structured set of elements describing specific aspects of an organisation's maturity, which also helps to define and understand processes in the organisation. The maturity model often includes a common terminology, a common vision and structure for setting priorities for improvement actions. The most common universal models nowadays are:

- Organisational Project Management Maturity Model (OPM3) (PMI, 2008),
- Prince 2 Maturity Model (OGC, 2007),
- Project Management Maturity Model (PMI, 2008),
- Project Management Process Maturity Model – PM2 (PMI, 2008),
- Project Management Maturity Model – ProMMM (Kerzner, 2005),
- Strategic Project Management Maturity Model (Schott, Campana, 2005; Grundy, Brown, 2002).

Project Maturity Models can be divided into two groups. The first group of models (which includes, among others, Prince2 Maturity Model, Kerzner Project Management Maturity Model, OGC Project Management Maturity Model and PM Solutions Project Management Maturity Model) involves assigning an organisation to one of several levels of project maturity (usually five), and these are of a static and dynamic nature. The second group comprises models that do not determine the level of maturity of the organisation but use them to assess individual areas of project management in the organisation. The result of the assessment is mostly expressed in percentages and points. This group includes the Organisational Project Management Maturity Model (OPM3) and all other related models, most often developed by consulting companies based on OPM3.

For the purpose of this article, the model proposed by Spałek (Spałek, 2013) was used, in which the degree of maturity in project management should be assessed in the following four key areas:

- methods and tools (M),
- human resources (L),
- the project environment (S),
- knowledge management (W).

Five levels of maturity in project management have also been identified, namely (Table 1):

- level 1 – Initial,
- level 2 – Standardisation,
- level 3 – Applications/Usage,
- level 4 – Systemic management,
- level 5 – Self-improvement.

Table 1.
Levels of project maturity in particular areas of measurement

LEVEL	AREA			
	METHODS AND TOOLS	**HUMAN RESOURCES**	**ENVIRONMENT**	**KNOWLEDGE MANAGEMENT**
5. Self-improvement	Systemic self-improvement	Systemic self-improvement	Systemic self-improvement	Systemic self-improvement
4. Systemic management	Standard methods and tools used for all projects	Commonly used standards	Management and organisational system fully supporting ZP	Comprehensive knowledge management system
3. Applications/ Usage	Standard methods and tools used for most projects	Standards used for most cases	Management and organisational system, supporting ZP to a great extent	Knowledge management standards covering most areas
2. Standardisation	Defined but selectively used methods and tools	Defined but selectively applied standards	Management and organisational system partially supporting ZP	Defined standards for the management of knowledge segments
1. Initial	Lack of defined standard methods and tools for projects	Lack of defined standards of human resources management	Lack of management and organisational system supporting ZP	Lack of defined knowledge management standards

(Left vertical header: MATURITY OF AN ENTERPRISE)

Source: Spałek, 2013.

2. The characteristics of mining service enterprises in Poland

The transformation of the Polish economy initiated in 1989 also affected the hard coal mining sector. The period of transformation of the Polish economy towards a market economy began the process of restructuring the hard coal mining industry. One of the restructuring effects was the separation of organisational units from the structures of mines, which performed previously selected functions in the scope of implementation of basic, preparatory, supporting and accompanying processes of hard coal production. These entities were transformed into commercial law companies, and their activity involved the provision of services to hard coal mines on an outsourcing basis. Currently, these services are provided on the basis of orders for the execution of specialist mining works. Presently, the share of mining service enterprises in the structure of the hard coal production process is significant. A study of the documentation of tenders for coal enterprises in 2018 showed that mining service enterprises carry out orders at every level of partial processes, understood as a technological process which must be carried out in order to produce coal (Fig. 1). Mining service enterprises in Poland provide their services on the basis of orders for the execution of specialist access, preparatory, reinforcement, decommissioning and maintenance works. It can be said that these orders have the characteristics of projects, which results from the specificity of mining activity, which is characterised by constantly changing mining and geological conditions occurring in mines and the movement of elements of the production process within the rock mass. However, the complexity of these projects results from the nature and scope of the works and from the level of involvement of the company's resources.
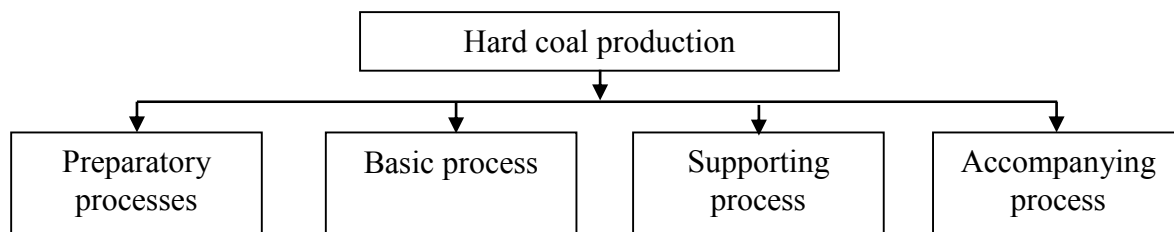
Figure 1. Technological processes in coal production. Source: own elaboration.

Research shows that in mining service enterprises, the number of projects carried out for mining companies and their value in recent years has been showing an upward trend. A characteristic feature of mining service enterprises is the diversity of projects carried out. In the context of preparatory processes, there are projects related to:

- creating opening-out or preparatory headings,
- maintaining the work ability and the condition specified in the OHS regulations of the opening-out or preparatory headings,
- modernisation of opening-out or preparatory headings.

The projects carried out in the basic processes are related to:

- exploitation of mine walls (reinforcement of walls, exploitation of walls, modernisation of technical equipment of walls, maintenance of walls, decommissioning),
- execution of tasks in the Mechanical Coal Processing Plant.

Mining service enterprises execute large-scale projects in support processes. These include, for example, projects for mines related to:

- ventilation (construction of ventilation dams),
- safety of work (making holes and shafts for methane drainage, building methane drainage pipelines),
- backfilling, compressed air,
- transport (construction, maintenance, operation of haulage conveyors, material handling),
- power economy (operation of switchgears).

Accompanying processes, such as mining damage repair, modernisation, construction and maintenance of environmental protection facilities, are increasingly being implemented through projects outsourced to service companies.

In 2018, the number of projects implemented by 26 Polish mining service enterprises in the Polish coal mining industry amounted to 234 in Poland, including 185 projects which were the basis for the implementation of preparatory processes and 49 for basic processes (Figure 2). The value of projects executed by mining service enterprises in 2018 exceeded PLN 1 billion.
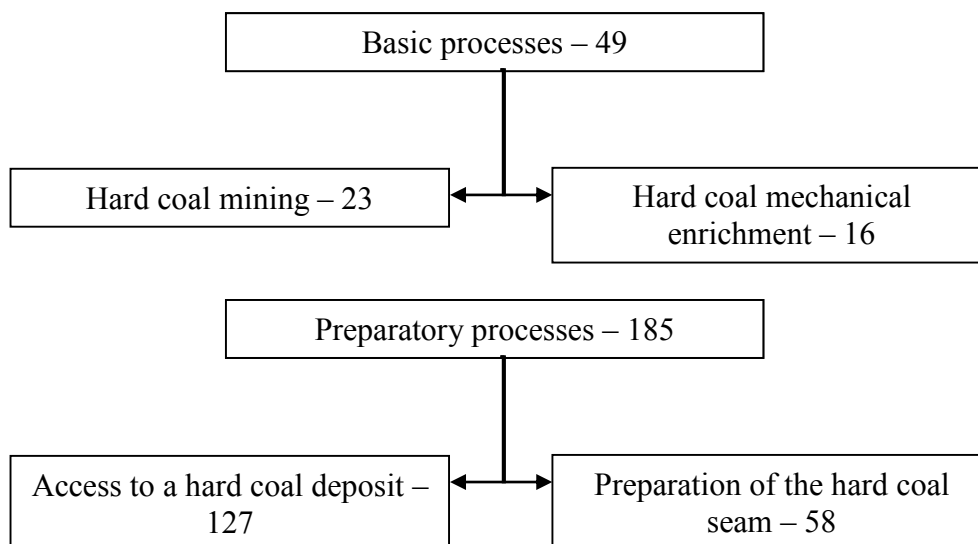
Figure 2. Number of projects executed in particular coal production processes. Source: own elaboration.

The results of the research presented suggest that the activities of the mines are highly dependent on mining service enterprises. The projects related to the construction of headings alone account for about 30% of the total number of mining works in Polish mines (Table 2).

Table 2.
Preparatory work – drifts in the years 2015-2018

	2015	**2016**	**2017**	**2018**
length of mine workings with production – total [mb]	288 492	272 829	261 539	257 597
including the length of mine workings reported by the enterprises * [mb]	239 190	216 776	199 413	190 640
including the length of mine workings made by external enterprises [mb]	64 819	57 761	57 660	47 004
share of mine workings made by external enterprises [%]	27.1	26.6	28.9	24.7

Source: own elaboration based on data sent to the IDA Katowice branch by coal enterprises, which are obliged to submit such information.

Mining service enterprises have begun to use modern solutions for a better and more effective execution of these projects. Comprehensive coordination of processes is crucial for the simultaneous management of many projects, from the analysis of the project environment (including stakeholders) and optimal resource planning to a unified systemic approach to quality, project risk and finance management. Project management in a multi-project environment is not an easy task, hence it often does not bring about the expected results. Therefore, it is critical to adjust the organisational system of the company in such a way as to efficiently manage not only a single project, but also the entire portfolio of projects.

A further question arises whether mining service enterprises in Poland are well prepared for project management in a multi-project environment. This is a matter of the maturity of these organisations in relation to project management. With this in mind, research was conducted in the field of project management maturity assessment in mining service enterprises. They included survey research and unstructured interviews with the management staff.

The article presents the results of these studies. The research was conducted on the basis of a questionnaire prepared for this purpose. The questionnaire prepared for the survey contained 35 questions in four areas, i.e. human resources, methods and tools, environment and knowledge management.

3. Methods

The aim of the research was to assess the maturity level in project management of mining service enterprises in Poland. In mainly aims at obtaining answers to the following research questions:

1. Do mining service enterprises have a defined set of standards and project management tools?
2. Do they use these tools in project management?

3. Do mining service enterprises build systems to measure the performance of project managers?

4. Do mining service enterprises have an adequate organisational structure to support project management?

5. Is intellectual capital (knowledge and experience) accumulated, stored and used in mining service enterprises in subsequent projects?

For this study, 26 mining service enterprises that operate on the Polish market were invited to participate in the questionnaire, of which 19 enterprises (which accounts for 73% of the total population) took part, including 4 large, 11 medium and 4 small enterprises. The definition of small and medium enterprises was adopted as the Act on Freedom of Economic Activity of 2 July 2004 (Articles 105 and 106 of the Journal of Laws, No. 173, item 1807, Articles 103-110 have been in effect since 1 January 2005). Enterprises which exceed the statutory thresholds (turnover, number of employees, ownership structure) are classified as large.

Mining service enterprises that participated in the research carried out the following number of projects:

- small mining service enterprises – executed 12 projects, all of which were related to preparatory processes (i.e. maintaining the work ability of the opening-out and preparatory headings, as well as the modernisation of headings, in accordance with OHS regulations);

- medium mining service enterprises – executed 70 projects, including 18 basic projects (i.e. 10 projects related to extraction processes, 8 projects related to processes at the processing plant), 52 preparatory projects (i.e. making 22 preparatory and opening-out headings, modernisation of 16 headings and maintenance of 14 headings);

- large mining service enterprises – executed 45 projects, including 10 basic projects (i.e. 5 projects related to extraction processes, 5 projects related to the processing plant), 35 preparatory projects (10 projects related to the creation of preparatory and opening-out headings, 10 projects related to the modernisation of headings and 15 projects related to the maintenance of headings).

With regard to the number of projects executed in one year, it can be concluded that the mining service enterprises in Poland are focused on project management.

4. Results

The results of the survey research carried out among mining service enterprises in Poland in relation to the following areas — methods and tools, human resources, environment and knowledge management — are presented in Tables 3 to 6.

5. Discussion

The discussion of the survey research results was conducted for the areas of methods and tools, human resources, environment and knowledge management.

The area of methods and tools

The survey research showed that 90% of the enterprises participating in the research (i.e. 17 mining service enterprises) have an established project management policy, including all medium and large mining service enterprises. This policy is established in 50% of the small mining service enterprises. The examined enterprises have defined methods and tools and apply them in most projects; this is the case in 74% of enterprises. However, it should be noted that 100% of medium and large enterprises use methods and tools for project management and adapt them to the needs of individual projects (i.e. 45% of medium and 75% of large enterprises use project management methods and tools). However, only 25% of small mining service enterprises use project management methods and tools. All surveyed medium and large enterprises have a common, defined language to describe the activities and results in the project, and only 25% of small enterprises have a common and well-defined language to describe the activities and results in the project.

In the scope of methods and tools, the project maturity of medium and large mining service enterprises should be evaluated at level 3 (Applications/Usage), which implies the use of standard methods and tools in most projects. However, for small mining service enterprises, the project maturity here is at level 1 (Initial). In other words, the small mining service enterprises do not have defined standard methods and tools for project management.

The area of human resources

The conducted research indicates that 84% of enterprises have a quality management system certified by an external organisation, i.e. all medium and large enterprises, but only one small mining service enterprise. With regard to the existence of qualified project managers, 79% of enterprises have such employees, while all large enterprises and 91% of medium enterprises, and only 25% of small enterprises, have such employees. In 92% of large enterprises, there are systems ensuring adequate competences and professional development of managers and people assigned to projects, while in medium and small mining service enterprises, this is only true in 45% and 25% of cases, respectively.

In small mining service enterprises, the project maturity was assessed at level 1 (Initial). This is due to the fact that they do not have defined standards of human resources management. In medium mining service enterprises, the project maturity was assessed at level 2 (Standardisation). This means the application of selectively defined standards. In large mining service enterprises, the project maturity was assessed at level 3 (Applications/Usage), where human resources management standards are applied in most projects.

Table 3.

The results of research regarding the area of methods and tools in mining service enterprises in Poland

No.	Question	Small enterprises									Medium enterprises									Large enterprises								
		Answers									Answers									Answers								
		Yes	No	Never	Sometimes	Mostly	Always	Yes	No	Hard to say	Yes	No	Never	Sometimes	Mostly	Always	Yes	No	Hard to say	Yes	No	Never	Sometimes	Mostly	Always	Yes	No	Hard to say
1.	The enterprise has an established project management policy	2	2								11									4								
2.	Appropriate scheduling tools are used in the projects	1	3								9	2								4								
3.	The enterprise possesses and applies a risk management system in its projects				3	1									5	6									4			
4.	The enterprise is able to define how the success of a project will be measured				2	2									5	6									4			
5.	The enterprise measures the business value of the project for the organisation			1	1	2									3	8								1	3			
6.	The enterprise utilises defined processes in projects in order to allocate human resources and their records			1	1	2									6	5									4			
7.	Standard, well-defined techniques and tools are customised to meet the demands of individual projects			1	2	1									6	5								1	3			
8.	The enterprise collects standardised metrics from the projects			3		1									8	3									4			

Cont. table 3.

No.	Description								a	b	c							d	e								f		
9.	The enterprise has defined standard tools and techniques and applies them in project management										4							11									4		
10.	The enterprise has standardised, framework division into stages (measures) in projects										4							11									4		
11.	The enterprise has a common, defined language to describe the activities in the project								1	1	2							11									4		
12.	The company has a common, defined language to describe the results of the project									1	3							11									4		
13.	The enterprise has defined processes for the allocation of human resources and their records									1	3							6	5								4		
14.	The projects apply the base schedule (where the base schedule is understood as the schedule of progress in a specified time imposed by the contracting party)								1		3							10	1								4		
15.	The enterprise applies a system which ensures the collection of reliable data on projects								1		3							10	1								4		
16.	The enterprise has a system of storing project data									2	2							11									4		
17.	Processes concerning the definition of project requirements are examined for potential improvements									3	1							6	5								4		
18.	Processes associated with estimating costs in projects are reviewed for potential improvements									3	1							6	5								4		

Own elaboration.

Table 4.

The results of research regarding the area of human resources in mining service enterprises in Poland

No.	Question	Small enterprises									Medium enterprises									Large enterprises								
		Answers									Answers									Answers								
		Yes	No	Never	Sometimes	Mostly	Always	Yes	No	Hard to say	Yes	No	Never	Sometimes	Mostly	Always	Yes	No	Hard to say	Yes	No	Never	Sometimes	Mostly	Always	Yes	No	Hard to say
1.	The enterprise has a quality management system certified by an external organisation	1	3								11									4								
2.	The people who play particular roles in the project are provided with appropriate training in project management		4								3	8								4								
3.	The enterprise has highly skilled project managers							1		3							10		1							4		
4.	The people assigned to the projects are competent to fulfil their given roles							1	3								5	1	5							4		
5.	The enterprise has procedures and mechanisms in place that ensure professional project managers and project team members							1	3								4	4	3							4		
6.	The enterprise provides professional development of project managers							1	2	1							6	5								3	1	

Own elaboration.

Table 5.

The results of research regarding the area of environment in mining service enterprises in Poland

No.	Question	Small enterprises									Medium enterprises									Large enterprises								
		Answers									Answers									Answers								
		Yes	No	Never	Sometimes	Mostly	Always	Yes	No	Hard to say	Yes	No	Never	Sometimes	Mostly	Always	Yes	No	Hard to say	Yes	No	Never	Sometimes	Mostly	Always	Yes	No	Hard to say
1.	Definitions of project aims (except for time, cost and scope) include clearly distinguished strategic goals			1	3									4	5	2						1	3					
2.	The enterprise is aware of how valuable the project is							1		3							10		1							4		
3.	The enterprise applies project management to achieve the organisation's business objectives									4							9		2							4		
4.	The enterprise is well aware of how valuable project management is							1	1	2							10		1							4		
5.	The enterprise has a well-defined vision of project management							1	1	2							9		2							4		

Own elaboration.

Table 6.

The results of research regarding the area of knowledge management in mining service enterprises in Poland

No.	Question	Small enterprises									Medium enterprises									Large enterprises								
		Answers									Answers									Answers								
		Yes	No	Never	Sometimes	Mostly	Always	Yes	No	Hard to say	Yes	No	Never	Sometimes	Mostly	Always	Yes	No	Hard to say	Yes	No	Never	Sometimes	Mostly	Always	Yes	No	Hard to say
1.	The enterprise has a defined system of cooperation and exchange of information among project managers		4								5	6								3	1							
2.	The enterprise records the knowledge and experience acquired during the execution of individual projects			1		2	1								6	5										2	2	
3.	The enterprise employs procedures and mechanisms that ensure that project managers and project team members have adequate knowledge and experience			3	1									1	4	6										1	3	
4.	The enterprise is a community of people interested in project management							2	2								6	1	4							2		2
5.	Intellectual capital is collected and stored							3	1								9		2							3		1
6.	Intellectual capital is utilised in next projects							2	2								8		3							3		1

Own elaboration.

The area of the environment

The research conducted shows that only 37% of enterprises define project objectives (except for time, cost and scope), which include clearly identified strategic objectives. Only 63% of medium-sized enterprises have such project objectives. 79% of the enterprises are conscious of the value of the project for the organisation. Only 75% of small enterprises are not aware of the value of the project. In 68% of the enterprises, project management is used to achieve the business objectives of the organisation; this is the case for 100% of large mining service enterprises. However, project management for business purposes is not used in all small mining service enterprises. In 79% of the researched mining service enterprises, there is a general awareness of the value of project management. Only 25% of small enterprises have such awareness. 73.6% of mining service enterprises have a defined vision of project management. There is no defined project management vision for 75% of small enterprises.

Project maturity in the area of project environment is diversified in mining service enterprises and has been assessed as follows:

- in small mining service enterprises at level 1 (Initial), as they do not have a management or organisational system to support project management,
- in medium mining service enterprises at level 2 (Standardisation), as these organisations have management and organisational systems that partially support project management,
- in large mining service enterprises at level 3 (Applications/Usage), where these systems are mainly used for project management.

The area of knowledge management

The conducted research shows that only 42% of mining service enterprises have a defined system of cooperation and flow of information among project managers. 45% of medium enterprises and 75% of large enterprises have a defined system. There is no such system in small mining service enterprises. In 94% of mining service enterprises, including all large and medium enterprises, and only 25% of small enterprises, the knowledge and experience gained during the execution of individual projects is recorded. In 73.6% of enterprises, procedures and mechanisms are applied that ensure that project managers and project team members have the appropriate knowledge and experience, while in no small enterprise are such procedures applied. In only 42% of mining service enterprises is there a community of people interested in project management. In small mining service enterprises, there is no such community. In medium enterprises, this is 50%, and 55% in large enterprises. In 63% of the researched enterprises, intellectual capital is gathered and stored. And only 57.8% of mining service enterprises ensure professional development of project managers, while this is 75% in large enterprises, 73% in medium enterprises and 0% in small enterprises.

The project maturity of large mining service enterprises in the area of knowledge management was assessed at level 2, as standards are defined in these enterprises but are applied selectively. Unfortunately, small and medium mining service enterprises have no standards in knowledge management, and the maturity of project management in this area was assessed at level 1 (Initial).

The summary of the survey research, conducted with a view to determine the level of maturity in the project management of mining service enterprises in Poland, is shown in Table 7.

6. Summary

With regard to the results of the conducted survey research, the answers to the questions were obtained. The research results showed that large and medium-sized mining service enterprises usually have defined standards and tools for project management and apply them in practice. Furthermore, they develop systems for measuring the efficiency of project managers and have an appropriate organisational structure in place to support project management. Intellectual capital (knowledge and experience) is gathered, stored and used in further projects. However, there are no appropriate mechanisms in place to ensure the best possible use of this capital. Large and medium-sized enterprises mostly have a maturity level 2 or 3 for project management.

Small mining service enterprises are generally at the lowest level of project maturity, which means that they do not have defined standards and tools for project management, they do not have efficiency measurement systems for project managers, they do not have a proper organisational structure, and they do not gather and store the knowledge of project teams.

Table 7.
Assessment of the project maturity of mining service enterprises in Poland – research results

Mining service enterprises	Area			
	Methods and Tools	Human Resources	Environment	Knowledge Management
Total	LEVEL 3 Applications/Usage	LEVEL 2 Standardisation	LEVEL 2 Standardisation	LEVEL 1 Initial
Small enterprises	LEVEL 1 Initial	LEVEL 1 Initial	LEVEL 1 Initial	LEVEL 1 Initial
Medium enterprises	LEVEL 3 Applications/Usage	LEVEL 2 Standardisation	LEVEL 2 Standardisation	LEVEL 1 Initial
Large enterprises	LEVEL 3 Applications/Usage	LEVEL 3 Applications/Usage	LEVEL 3 Applications/Usage	LEVEL 2 Standardisation

Source: own elaboration.

References

1. Grundy, T., Brown, L. (2002). *Strategic Project Management – Creating Organizational Breakthroughs*. Cornvall: Thomson.
2. http://sjsi.org/slowo/model-dojrzalosci/, 07.01.2018.
3. Juchniewicz, M. (2009). *Dojrzałość projektowa organizacji*. Warszawa: Biblioteka Project Managera.
4. Juchniewicz, M. (2009). Dojrzałość projektowa organizacji i jej zastosowanie w zarządzaniu. *Przegląd Organizacji, 7-8*.
5. Juchniewicz, M. (2016). Osiąganie doskonałości w realizacji projektów przy wykorzystaniu modelu dojrzałości projektowej. In: E. Trocki, E. Bukłaha, *Zarządzanie projektami – wyzwania i wyniki badań*. Warszawa: Wydawnictwo SGH.
6. Kerzner, H. (2005). *Advanced Project Management*. Gliwice: Helion.
7. *Managing Successful Programmes* (2007). Norwich: Office of Government Commerce, The Stationery Office.
8. *Project Management Body of Knowledge* (2008). Project Management Institute.
9. Schott, E., Campana, Ch. (2005). *Strategisches Projektmanagement.* Berlin-Heidelberg: Springer Verlag.
10. Spałek, S. (2013). *Dojrzałość przedsiębiorstwa w zarządzaniu projektami*. Gliwice: Wydawnictwo Politechniki Śląskiej.
11. Spałek, S. (2015). Granice inwestycyjne zwiększania stopnia dojrzałości w zarządzaniu projektami. In: W.R. Knosala, *Innowacje w zarządzaniu i inżynierii produkcji, Tom I*. Opole: Oficyna Wydawnicza Polskiego Towarzystwa Zarządzania Produkcją.
12. Spałek, S., Karbownik, A. (2014). Rekomendacje dla zwiększenia stopnia dojrzałości w zarządzaniu projektami w przedsiębiorstwach przemysłu maszynowego w Polsce. *Przegląd Organizacji, 9*.
13. Strojny, J. (2012). *Innowacyjność i kreatywność w rozwiązywaniu problemów biznesowych.* Rzeszów: Politechnika Rzeszowska.
14. Strojny, J. (2019). *Orientacja procesowo-projektowa organizacji samorządu lokalnego. Wymiary, poziomy dojrzałości, determinanty oraz efekty w zakresie rozwoju lokalnego.* Rzeszów: Oficyna Wydawnicza Politechniki Rzeszowskiej.
15. Wyrozębski, M., Juchniewicz, M., Matelski, W. (2012). *Wiedza, dojrzałość, ryzyko w zarządzaniu projektami. Wyniki badań.* Warszawa: Oficyna Wydawnicza Szkoła Główna Handlowa.

GLOBAL FINANCIAL CRISES, PROFITABILITY
AND OUTSOURCING IN INDUSTRIAL COMPANIES IN POLAND

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Abstract: The purpose of the article was to determine whether there is a relationship between the use of outsourcing and profitability in industry depending on time. The research sample consisted of 200 enterprises operating on the Polish market. The study covered the years 2000-2018. The study was divided into 2 parts. It turned out that during the financial crisis, profitability is significantly lower in the case of return on assets. During the crisis, industrial companies were on the verge of profitability and deficit. The average level of return on assets during the crisis was significantly lower than before and after the crisis. Given the return on equity and return on sales, the planned contrast turned out to be statistically insignificant. It should be noted that there is a certain limitation in the interpretation of results, because external services also consist of services that are not outsourced, e.g. banking services.
In addition, there is agreement that with the increase in the use of services of external suppliers (leading to an increase in the cost of external services), the profitability of sales decreases. The study does not allow one to draw a conclusion about the existence of a relationship between the use of outsourcing in industrial companies and profitability.

Keywords: financial crisis, profitability, outsourcing, industrial companies.

1. Introduction

Increasingly, companies are deciding to implement outsourcing. Large competition encourages the search for interesting forms of enterprise financial management. Outsourcing is becoming a fashionable management tool. In economics, the term 'outsourcing' is used to show the participation of external sources in the development of a company. This paper refers to a company that used its internal resources (Aalders, 2001). In other words, it is a transfer of managerial responsibility to a third party. The service contract is binding (Lysons, 2003).

The decision to implement outsourcing is dictated by the reduction of costs. This is indicated, among others, by Dunford (2000). He claims that the primary task of outsourcing is to focus the company on its core activities and reduce costs. All activities that the company may delegate should be left to an external expert (Dunford, 2000). In addition, quality is an important

factor that customers pay attention to. Therefore, care for the quality of products and services improves the quality of the entire company. According to Kakabadse (2003), outsourcing is a way to provide the best quality for products and services. Delegating certain activities to experts increases the quality of the product. Outsourcing is one of the important elements of the strategy of companies in Europe and the US (Kakabadse, 2003).

The article consists of five parts. The following section discusses the problem, given the popularity of outsourcing and its impact on the profitability of foreign enterprises. The second part presents the research sample and its short characteristics. The next part is a description of the research methodology with a detailed explanation of the possibility of using statistical tests. The results are then described. The last section draws conclusions for Polish industrial companies.

2. Profitability, outsourcing and financial crisis – literature review

Many scientists have already conducted research on the profitability of companies. There are also many studies on outsourcing and business operations during the financial crisis (2006-2009). Despite this, few researchers combined these two aspects related to a company.

Noah Mwelu did a study on a sample of 80 manufacturing companies in Uganda before the financial crisis. The study determined the level of profitability impacts on outsourcing in Uganda. The author indicates that there is a strong and significant relationship between outsourcing and profitability. Despite this, outsourcing is not yet clear enough to affect the profitability levels of manufacturing companies in this country (Mwelu and Moya, 2014).

Görg and Hanley (2004) investigated the relationship between outsourcing and profitability for the electronics sector in Ireland before the financial crisis. The study concerned manufacturing and service activities – a sample of 215 companies. They stated that large companies use outsourcing of materials and services. For small businesses, outsourcing services is not so straightforward (Görg, and Hanley, 2004).

In turn, Kimura (2002) presents a different approach to the role of outsourcing. He claims that those with weak activities are more likely to use external experts. The study was conducted on a sample of companies from the machine-building sector in Japan before the financial crisis. The author concludes that companies with high profits do not use outsourcing. Weak companies (low surplus in sales and low value added to sales) are more likely to use subcontractors. The author concludes that companies that do not get involved obtain the highest profits (Kimura, 2002).

Juma'h and Wood studied the business results of outsourcing companies. It was concluded that profitability and liquidity decrease over the years with outsourcing. In turn, the increase in profitability and liquidity increases when companies resign from outsourcing services

(Juma'h, and Wood, 2000). Maziarczyk comes to other conclusions (2020). A survey was conducted on a sample of companies from Poland, and the aim of the study was to check the impact of outsourcing on the productivity of companies in the period 2010-2018. It was concluded that as outsourcing increases, the productivity of Polish industrial companies increases. In addition, it has been proven that outsourcing will positively affect the entire country by improving Gross Domestic Product (Maziarczyk, 2020). Performance research in connection with outsourcing was also conducted. Findings show that companies that have distorted their production structure show higher growth, while companies using the verticalisation strategy achieved better results in terms of debt ratio (Calabrese, and Erbetta, 2005).

Agburu, Anza, Iyortsuun (2017) argue that small and medium-sized companies, like large organisations, outsource services. In their research, they list a number of outsourcing factors. These factors led to an increase in the profitability of small and medium enterprises. The study covered the period of both the crisis and after the crisis. However, the authors did not distinguish this factor (Agburu, Anza, Iyortsuun, 2017).

Isaksson and Lantz (2015) studied outsourcing strategies among small manufacturing companies. The authors do not state what period the study covered. It is only known that the data was taken from the annual data from 2011. However, we can guess that the study was about post-crisis data for a sample of 700 small (less than 50 employees) manufacturing companies in Sweden. They mainly studied the relationship between outsourcing and return on investment (ROI) and return on capital (ROE). However, this study did not show the impact of these outsourcing strategies on SME profitability (Isaksson, and Lantz, 2015).

Further studies were conducted by Edvardsson and Teitsdóttir. The purpose of their research was to analyse the use of outsourcing in the services sector after the collapse of banking. They compared the results of Icelandic companies from 2009 and 2013. The authors state that outsourcing has not increased, but some SMEs have begun outsourcing IT and human resource management to a greater extent. It is emphasised that there is little research on SMEs in the aftermath of the financial crisis (Edvardsson, and Teitsdóttir, 2015),

K. Denčić-Mihajlov (2014) examined how companies from Serbia adapt to the conditions of the financial crisis. The sample included 108 non-financial companies. The author states that larger and smoother companies achieve higher profitability. The effectiveness of assets and the possibility of growth proved to be important for determining profitability as a return on assets. The study points to the urgent need to improve business performance during the crisis. The conclusions of the study concern only the period of the financial crisis. The author indicates that it is worth analysing profitability before the crisis, during the crisis and after the crisis (Denčić-Mihajlov, 2014).

Speaking about the benefits of outsourcing, the article seeks to check how outsourcing affects the profitability of industrial companies in Polish conditions during the financial crisis, as well as before and after it. There are studies based on a combination of outsourcing and

profitability, but this is new for Polish conditions. The article brings new information about the relationship between the profitability of Polish industrial companies and outsourcing. A review of literature shows that there is no research on the relationship between outsourcing and the profitability of Polish enterprises during the crisis. It is worth paying attention to research on this subject.

The financial crisis of 2007-2009 occurred as a result of the credit crisis in 2006. Specialists say the beginning took place in the US housing market, and the general decline in property prices caused stress on loans (Benmelech, and Dlugosz, 2009).

The 2007-2009 financial crisis is commonly considered the worst crisis since the Great Depression of the 1930s, which turned out to be a massive shock for enterprises. The crisis caused a sharp fall in share prices and more expensive loans, which largely affected the financial situation of companies. The global financial system was at risk of collapse by rescuing uninsured large financial institutions (Brunnermeier, and Pedersen, 2009).

According to specialists, the economic crisis of 2007-2009 initially bypassed the Polish economy. Dangers were sought in high state debt and a large share of imports in domestic production. As it turned out, Poland was also affected by the effects of the global crisis. The value of the Polish currency (Polish zloty) was significantly reduced as a result of a speculative attack, and enterprises began to have financial problems with currency options. Despite this, Poland was positively assessed when taking into account other economies during the crisis. The largest effect for Poland was the reduction of the deposit interest rate from 4.5% to 2.00%[1].

3. Sample

The purpose of the article was to check whether the use of outsourcing in Polish industrial companies affects their profitability over time. Companies that are listed on the Warsaw Stock Exchange were analysed. Due to the specifics of the study, the research sample covered 200 companies that operate in the industrial sector.

The sample was based on data provided by the Notoria database from 2018. This database contains the financial statements of Polish companies. The choice of the sample that was ultimately analysed was as follows: firstly, from the pool of all companies, industrial companies were chosen, as the study concerns only this sector. This was done on the basis of descriptions of the characteristics of individual companies also available in this database. Due to the need for accurate calculations from the sample, companies were then selected for which all data needed to calculate the profitability ratios and the data needed to determine outsourcing were

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[1] Experts say that the increase in GDP was caused by an increase in net exports and an increase in total consumption [http://nbp.pl/ home.aspx? f = / / daily /, Forsal.pl].

provided. The study concerned the period 2000-2018. In this way, a database consisting of annual data for 200 companies from Poland was optained, which consists of companies from many different industries.

4. Methodology

Data from the study was processed using a statistical program. There are three types of variables throughout the analysis: dependent, independent and grouping variables. A detailed list of all variables is provided in Table 1. The data of the research part and research hypotheses refers to individual variables, which will be listed later.

Table 1
All descriptions of variables used in this analysis

Variables	Description
Dependent variables • Return on assets (ROA) • Return on equity (ROE) • Return on sales (ROS)	Net profit divided by total assets multiplied by 100 Net profit divided by equity capital multiplied by 100 Net profit divided by sales revenues multiplied by 100
Independent variables • outsourcing	external services divide by sales revenues (external services include costs that are not outsourced; therefore, identifying outsourcing as a foreign service is an optimistic approach)

Source: own study.

Three indicators were used to determine the profitability of companies – return on assets, return on equity and return on sales. As it is believed that one indicator does not give an objective picture of the situation, 3 indicators to measure profitability were used. Depending on individual parts of the study, profitability becomes dependent and once independent. The value of outsourcing was determined on the basis of the relationship of external services to sales transactions (external services divided by sales revenues). The value of outsourcing was defined on the basis of the value of external services, which are part of the generic cost system. There is a certain limitation in the interpretation of results, because external services also consist of services that are not outsourced, e.g. banking services. At the beginning, I compared the profitability ratios among (ROA, ROE, ROS) or different indicators give the same result before the crisis, during the crisis and after the crisis. Therefore, the first (preliminary) hypothesis is put forward:

H1 a): the average level of ROA profitability changes over time.

H1 b): the average level of ROE profitability changes over time.

H1 c): the average level of ROS profitability changes over time.

The dependent variables used in this part of the study were data on profitable companies (depending on the hypothesis, this was ROA, ROE, ROS). The variables were divided into three periods. Thus, all variables are: ROA before the crisis, ROA during the crisis, ROA after the crisis, ROE before the crisis, ROE during the crisis, ROE after the crisis and ROS before the crisis, ROS during the crisis, ROS after the crisis. This part of the study did not require independent variables. In order to verify whether the hypotheses (H1a, H1b, H1c) are true and whether it can be stated that the indicators give the same result before the crisis, during the crisis and after the crisis, analysis of variance with repeated measurements was used. Repeated measurement means that the variable has been tested many times. In the study, multiple measurements of the same variables at intervals were made. In this case, time is an intra-object factor. The greatest benefit of the ANOVA test with repeated measurements is the reduction of individual differences, i.e. the variation between variables in different groups (Niewiarowski, 2013). We can use this test, because the assumptions are met. The variables have a distribution close to normal, the variances of the distribution of variables are equal, and the fulfilment of the sphericity assumption (no correlation between successive measurements). In addition, the analysis was supplemented with contrast analysis.

The ratio of external services to sales transactions were then compared. Whether the same result was available before, during and after the crisis was also checked. Therefore, one should hypothesise:

H2: The average level of outsourcing varies over time.

The dependent variables used in this part of the study were the data on outsourcing companies, i.e. the ratio of external services to sales revenues. The variables were divided into three periods. Thus, all variables are: outsourcing before the crisis, outsourcing during the crisis and outsourcing after the crisis. This part of the study did not require independent variables. In order to verify whether the H2 hypothesis is true and whether it can be stated that the indicators give the same result before the crisis, during the crisis and after the crisis, analysis of variance with repeated measurements was used. The possibility of using the test confirms the fulfilment of the assumptions for this test, i.e. the variables have a distribution similar to normal, the variances of the distribution of variables are equal, the fulfilment of the assumption of sphericity.

The next step was to check whether outsourcing before, during and after the crisis is related to profitability in these periods. Profitability was defined using three indicators: ROA, ROE, ROS. The following hypotheses were checked:

H3: a) there is a relationship between pre-crisis ROA and outsourcing.

H3: b) there is a relationship between ROA during a crisis and outsourcing.

H3: c) there is a relationship between post-crisis ROA and outsourcing.

H4: a) there is a relationship between pre-crisis ROE and outsourcing.

H4: b) there is a relationship between ROE during a crisis and outsourcing.

H4: c) there is a relationship between ROE after crisis and outsourcing.

H5: a) there is a relationship between pre-crisis ROS and outsourcing.

H5: b) there is a relationship between ROS during a crisis and outsourcing.

H5: c) there is a relationship between post-crisis ROS and outsourcing.

The dependent variables used in this part of the study were data on profitable companies (depending on the hypothesis, this was ROA, ROE, ROS). The independent variable was the use of outsourcing, which was defined as the value of external services. In order to verify whether the hypotheses (H3, H4, H5) are true and whether it can be concluded that there is a significant relationship between outsourcing and the profitability of industry before the crisis, during the crisis and after the crisis, the Pearson correlation test was used. The possibility of using the test is confirmed by the fact that the variables have a distribution close to normal (sample greater than 100 observations).

After analysing the correlation, a regression analysis was then performed. This study was done to determine the degree of impact of outsourcing of certain activities in a company on the level of profitability in industrial companies in Poland. Whether it is possible to predict the level of profitability based on outsourcing was also checked. A general straight line regression model was created:

$$Y = \beta_0 + \beta_1 X + \epsilon$$

Where:

Y – dependent variable (profitability).

X – independent variable (outsourcing).

β_0, β_1 – structural parameters of the model.

ϵ - random component.

We accept this mathematical formula. It contains relationships between variables and the assumption of random processes affecting the results of individual measurements. We use the least squares method to determine a line (y = b_0 + b_1 * x) that fits to our linear regression model.

5. Result and their analysis

When analysing the use of outsourcing by Polish industrial companies, one can expect differentiation. The share of funds allocated by entities to the services of external suppliers differ depending on the industry sector. Therefore, the value of external services for the entire sample of 200 industrial enterprises was averaged over a given period. (copy) Before the 2000-2005 crisis, the 2006-2009 crisis and after the crisis 2010-2018. The study led to such results:

Table 2.
Basic descriptive

	Mean	Median	Minimum	Maximum	St. dev.
ROA before the crisis	9.3%	7.9%	1.8%	9.9%	4.7%
ROA crisis	7.7%	4.2%	0.4%	13.7%	2.2%
ROA after the crisis	8.0%	5.1%	1.2%	14.4%	3.5%
ROE before the crisis	19.1%	15.4%	4.0%	20.6%	5.8%
ROE crisis	16.0%	13.1%	1.5%	15.1%	4.4%
ROE after the crisis	14.3%	9.5%	2.6%	16.9%	4.8%
ROS before the crisis	8.6%	5.2%	1.0%	20.0%	6.0%
ROS crisis	7.2%	6.1%	0.3%	16.7%	6.2%
ROS after the crisis	7.4%	4.8%	1.0%	16.7%	6.2%
Outsourcing before the crisis	15.0%	17.5%	4.4%	15.3%	7.8%
Outsourcing crisis	12.2%	12.5%	3.2%	12.6%	6.4%
Outsourcing after the crisis	10.9%	9.5%	5.2%	15.1%	5.7%

Source: own study.

The study and verification of research hypotheses gave such results:

1) The average value of return on assets during the crisis for the sample was the lowest. During the crisis, it was 7.7% and was 1.6 percentage points lower than before the crisis. In turn, after the crisis, the return on assets improved to 8%, which is a slight increase of 0.03 percentage point. The median also confirms that profitability fell significantly during the crisis (4.2%), where before the crisis, the median was 7.9%. There are not many outliers on the sample. This is confirmed by similar values of the average and median return on assets. The lowest return on assets was during the crisis at 0.4%.

2) The average value of return on equity was the largest before the crisis (19%). During the crisis, it was lower by 3 percentage points and accounts for 16%. After the crisis, this value increased to 14% (which is smaller than before the crisis). This means that after the crisis, industrial companies did not managed to improve the return on equity enough to match the value before the crisis. The effects of the financial crisis had an impact on companies' results, worsening their situation. As you can see, there was a slight difference in the median. Before the crisis, the median was 15%, while after the crisis, there was a decline to 10%. The lowest index value reached 4% during the crisis.

3) The average value of the sales profitability index during the crisis turned out to be lower by only 1.4 percentage point than before the crisis. Based on the median, a significant improvement in profitability can be seen over the period considered. After the crisis period, the median return on sales was 4.8%, while during the crisis, this was 6.1%. The observations deviate from the mean value by 6% in each time interval.

4) The largest amplitude of the minimum and maximum value is seen in the ROS indicator. The sample is quite diverse. The observations deviate from the mean value by about 6%.

5) Analysing external services for the pre-crisis sample, during the crisis and after the crisis, there was no big difference between the average value and the median. The average value of the ratio of external services to sales revenues was the largest before the crisis. This proves its use during this period. In the crisis, this value fell, after which growth was again noted after the crisis.

From the above statistics, it can be concluded that the sample of 200 industrial enterprises is diversified in terms of profitability measured by various indicators and outsourcing depending on the period. The nature of the operations of the companies in the sample has a large impact on this, which shall be verified in the hypotheses.

5.1. Verification of hypothesis 1

At the beginning it is worth saying that the assumptions for the analysis of variance with repeated measurements have been met. The variables have a normal distribution because the sample includes more than 100 observations. Another assumption about equal variance also proved to be fulfilled. Levene's test did not detect significant differences between variances. The assumption of equal variance is met for $p > 0,05$ ($p = 0,061$). The third assumption of sphericity was also met (the assumption of sphericity is met for results not statistically significant $p > 0,05$). According to the Mauchley test, the sphericity assumption is seriously violated and detects significant deviations from the sphericity assumption $p = 0,00$ ($p < 0,05$) I applied the Huynh-Feldt correction ($p > 0,05$). This is a high-powered fix. Corrective factors take into account the deviation of the covariance matrix from combined symmetry and are designed to change the degrees of freedom that are associated with the F test (Stanisz, 2007). The data obtained from tests is presented in Table 3.

Table 3.
Test results of sphericity

	W	p	
		Mauchley's test	Huynh-Feldt corrections
ROA	0.41	0.00	0.762
ROE	0.58	0.00	0.445
ROS	0.53	0.00	0.36

* results are significant with $p < 0.05$.

Source: own study.

Based on the table, it can be concluded that the Huynh-Feldt tests do not detect significant deviations from the assumption of sphericity for ROA: $p = 0.762$ ($p > 0.05$); ROE: $p = 0.445$ ($p > 0.05$) and ROS: $p = 0.36$ ($p > 0.05$). Thus, the assumption of sphericity is fulfilled.

Based on the statistical test (ANOVA analysis of variance with repeated measurements), the results can be considered statistically significant with $p < 0.05$. We can therefore reject the hypothesis of equality of average profitability before, during and after the crisis. There are statistically significant differences between the means. This data is shown in Table 4.

Table 4.
Results of the one-dimensional ANOVA analysis test with repeated measurements

	F	p
ROA	33.23	0.000
ROE	5.41	0.005
ROS	4.19	0.016

* results are significant with $p < 0.05$.

Source: own study.

Based on the results obtained from the one-dimensional test of repeated measurements, it can be concluded that the average level of return on assets changes over time. This means that the profitability of Polish enterprises has changed over time. It was described as "before the crisis", "crisis" and "after the crisis". A similar situation was found in the case of return on equity and return on sales. The average level of ROE and ROS profitability is different before, during and after the crisis.

Based on the analysis, a large variation in average profitability (ROA, ROE, ROS) can be seen before, during and after the crisis. The greatest amplitude of value occurred at the return on assets. In addition, the average post-crisis value is much higher than even the pre-crisis profitability. Industrial enterprises achieved much lower profitability during the crisis. A slightly smaller variation occurred in the return on equity. Despite this, the profitability of ROA and ROE and ROS is clearly improving after the crisis. Still, using a priori contrast analysis, whether the average ROA/ROE/ROS level is significantly lower during the crisis compared to the period before and after the crisis will be examined. A priori analysis of contrasts is done after determining the significance of a given factor. Here, we examine the influence of a controlled factor at three levels and check whether the first group differs from the others. The null hypothesis has the form H0: $u1 = \frac{u2+u3}{2}$, which we write as $u1 - \frac{1}{2}u2 - \frac{1}{2}u3 = 0$, i.e. $2u1 - u2 - u3 = 0$ (Bedyńska, Cypryańska, 2013). To test the hypothesis, we assign weights (c1=2, c2=-1, c3=-1). In this study, we examine the effect of factor $u2 = \frac{u1+u3}{2}$, meaning that $-u1 + 2u2 - u3 = 0$. Thus, in this study, we assign weights c1=-1, c2=2, c3=-1. We study the contrast, and the coefficients adopted in this analysis are: (-1, 2, -1). Table 5 presents the received data.

Table 5.
A priori contrast analysis

	F	Standard error	p
ROA	43.6	0.010	0.001
ROE	2.94	0.023	0.087
ROS	2.16	0.015	0.141

Source: own study.

Examining the results obtained from the contrast analysis a priori, it can be seen that the planned ROA contrast proved significant with p < 0.05 (p = 0.001). The average level of return on assets during the crisis is significantly lower than before and after the crisis. Taking into account the return on equity and return on sales, the planned contrast turned out to be statistically insignificant with p > 0.05 (ROE p = 0.87, ROS p = 0.141). Thus, the average level of ROE and ROS during the crisis is not significantly lower than in the other periods examined.

5.2. Verification of hypothesis 2

The assumptions for the analysis of variance with repeated measurements have been met. The variables have a normal distribution, because the sample includes more than 100 observations. Another assumption about equal variance also proved to be fulfilled. Levene's test did not detect significant differences between variances. The assumption of equal variance is met for p > 0.05 (p = 0.078). The third assumption of sphericity was also met (the assumption of sphericity is met for results not statistically significant with p > 0.05). The Mauchley test does not detect significant deviations from the assumption of sphericity with p > 0.05 (p = 0.73). The test requires no corrections. The data obtained from tests is presented in Table 6.

Table 6.
Test results on Mauchley's sphericity

	W	**p**
Outsourcing	0.81	0.73

* results are significant with p < 0.05.

Source: own study.

Based on the statistical test (ANOVA analysis of variance with repeated measurements), the results can be considered statistically significant with p<0.05. We can therefore reject the hypothesis about the equality of average profitability before, during and after the crisis. There are statistically significant differences between the means. This data is shown in Table 7.

Table 7.
Results of the one-dimensional ANOVA analysis test with repeated measurements

	F	**p**
Outsourcing	2.37	0.15

* results are significant with p < 0.05.

Source: own study.

Based on the results obtained from the one-dimensional test of repeated measurements, it can be concluded that the average level of outsourcing changes over time. The coefficient was not statistically significant with p > 0.05 (p = 0.15). This means that outsourcing has not changed over time. It was described as "before the crisis", "crisis" and "after the crisis". Further analysis does not require contrast analysis.

5.3. Verification of hypothesis 3

Due to the fact that the average ROA profitability level is significantly lower in the crisis, we will check the correlation with outsourcing for this profitability. The next step was to examine whether outsourcing before, during and after the crisis is significantly related to the development of the industrial sector. To this end, we examined the relationship between outsourcing and profitability. Based on the statistical test (application of the Pearson correlation

test), it can be concluded that there is a positive possible relationship between profitability measures, outsourcing and global financial crises. However, not all correlation coefficients marked are relevant for the study (p < 0.05). In Table 8, we presented the correlation values according to the test. Therefore, hypothesis 3 can be accepted.

Table 8
Correlation results

	Outsourcing		
Variable	**Before the crisis**	**Crisis**	**After the crisis**
ROA before the crisis	-0.14 p = 0.82	-	-
ROA crisis	-	-0.22 p = 0.72	-
ROA after the crisis	-	-	**-0.93 p = 0.022**
ROE before the crisis	0.16 p = 0.80	-	-
ROE crisis	-	-0.14 p = 0.81	-
ROE after the crisis	-	-	-0.78 p = 0.12
ROS before the crisis	-0.3 p = 0.62	-	-
ROS crisis	-	-0.29 p = 0.64	-
ROS after the crisis	-	-	0.60 p = 0.19

* results are significant with p < 0.05.
** the correlation is negative in each case, but only in one is this relationship statistically significant.

Source: own study.

The test used shows that there is a positive possible relationship between profitability measures, outsourcing and global financial crises. Only the return on assets after the crisis period (p = 0.022) is statistically significant (p < 0.05). Other indicators are not statistically significant in this model (p>0.05). Analysing the ROA correlation coefficient r = -0.93, it can be concluded that there is a negative correlation between outsourcing after the crisis period measured by the amount of costs of external services and profitability measured by the ROA index. This means that as outsourcing increases after the crisis, the profitability of industrial enterprises decreases. In turn, the more outsourcing, the higher the cost utilisation of external services. This relationship can be considered very large, because the value of statistics is in the range | r | > 0.9. Assuming hypothesis 2, it can be stated that the use of outsourcing significantly reduces the profitability of Polish industrial companies measured by the return on assets after the crisis.

After analysing the correlation, a regression analysis was then performed. The dependent variable is only the return on assets after the crisis period because, as was previously proven, it is not related to the return on sales and the return on equity in any period. The results obtained can be seen in Table 9.

Table 9

Results of the regression analysis

Dependent variable	Parameter	R	R^2	β	F	df model	df the rest	$p < 0.05$
ROA after the crisis	-0.53	0.93	0.87	-0.93	19.4	1	3	0.022

** independent variable – outsourcing.

Source: own study.

Based on the data received, it can be said that there is a linear relationship between outsourcing and the return on assets of industrial companies after the crisis in Poland. Based on the least squares method, we make a straight line pattern. The resulting straight from the analysis has the formula y = -0.53 + 0.05. Along with the increase in the independent variable (outsourcing) by one point, a decrease in the dependent variable (profitability) by 0.53 points can be observed. The independent variable explained about 87% (R^2) of the variability of the dependent variable. The remaining part concerns other variables not included in this model. The beta parameter (-0.93) is consistent with the value achieved in the correlation test. There is a consensus here that along with the increase in the use of services of external suppliers (leading to an increase in the cost of external services), the return on assets is falling.

6. Conclusions

As a result of the ANOVA analysis carried out for repeated measurements, a significant statistical relationship between profitability ratio and time was revealed. It turned out that during the financial crisis, profitability is significantly lower in the case of return on assets. During the crisis, industrial companies were on the verge of profitability and deficit. The average level of return on assets during the crisis is significantly lower than before and after the crisis. Given the return on equity and return on sales, the planned contrast turned out to be statistically insignificant.

Based on the data obtained from the r-Pearson correlation test, we can then say that there is a linear relationship between outsourcing and the return on assets of industrial companies in Poland after the crisis. It can therefore be concluded that there is a positive possible relationship between profitability measures, outsourcing and global financial crises. There is a consensus here that with the increase in the use of services of external suppliers (leading to an increase in the cost of external services), the return on assets decreases. The study does not allow conclusions to be drawn about the existence of a relationship between the use of outsourcing in industrial companies and the profitability measured by ROE and ROS ratios both before and after the crisis. There is a certain limitation in the interpretation of results, because external services also consist of services that are not outsourced, e.g. banking services.

As part of the study, there were other issues worth considering. Since we already know what the relationship between the profitability of industrial companies and outsourcing is, it is worth checking how outsourcing affects other financial issues of enterprises, including the liquidity and indebtedness of Polish enterprises during and after the crisis. According to research, the Polish industry uses outsourcing to a lesser extent than services. The question is whether outsourcing is a solution for modern industrial enterprises? This question is left to the researchers, as it is worth conducting research not only in Poland, but also in other countries. We note a significant impact of outsourcing on the profitability of service companies and recommend conducting an in-depth analysis of outsourcing in this sector.

References

1. Aalders, R. (2001). *The IT Outsourcing Guide.* Chichester: Wiley, 37.
2. Agburu, J.I., Anza, N.C., Iyortsuun, A.S. (2017). Effect of outsourcing strategies on the performance of small and medium scale enterprises (SMEs). *Journal of Global Entrepreneurship Research*, DOI: 10.1186/s40497-017-0084-0.
3. Bedyńska, S., Niewiarowski, J., Cypryańska, M. (2013). *Analiza wariancji-integracja zagadnień.* S. Bedyńska, M. Cypryańka (eds.). Warszawa: SEDNO, 227.
4. Benmelech, E., Dlugosz, J. (2009). The credit rating crisis. *NBER Macroeconomics Annual*, *24,* 161-207.
5. Brunnermeier, M., Pedersen, L. (2009). Market liquidity and funding liquidity. *Review of Financial Studies*, *22,* 2201-2238.
6. Calabrese, G., Erbetta, F. (2005). Outsourcing and firm performance: Evidence from Italian automotive suppliers. *International Journal of Automotive Technology and Management*, *5, 4,* DOI: 10.1504/IJATM.2005.008585.
7. Denčić-Mihajlo, K. (2014). Profitability during the financial crisis evidence from the regulated capital market in Serbia. *South-Eastern Europe Journal of Economics*, 7-33.
8. Dunford, R. (2000). Key challenges in the search for the effective management of knowledge in management consulting firms. *Journal of Knowledge Management, 4, 4,* 295-300.
9. Edvardsson, I., and Teitsdóttir, U. (2015). Outsourcing and financial crisis: evidence from Icelandic service SMEs. *Employee Relations, 37, 1,* 30-47. DOI: 10.1108/ER-11-2013-0168.
10. Görg, H., Hanley, A. (2004). Does Outsourcing Increase Profitability? *Discussion Paper series.* IZA DP, 1372.

11. Juma'h, A., Wood, D. (2000). Outsourcing implications on companies profitability and liquidity: a sample of UK companies. *Work Study*, *49, 7,* 265-275. DOI:10.1108/ 00438020010350220.

12. Kakabadse, A., Kakabadse, N. (2003). Outsourcing best practice: transformational and transactional considerations. *Journal of Corporate Transformation, 10, 1*.

13. Kimura, F. (2002). Subcontracting and the performance of small and medium firms in Japan. *Small Business Economics, 18,* 163-175.

14. Lantz, I.A. (2015). Outsourcing strategies and their impact on financial performance in small manufacturing firms in Sweden. *International Journal of Business and Finance Research, 9, 4*.

15. Lysons, K., Gillinham, M. (2003). Purchasing and Supply Chain Management. *Prentice Hall*, 351.

16. Maziarczyk, A. (2020). Impact of outsourcing on the productivity of Polish industrial enterprises. *The Małopolska School of Economics in Tarnów Research Papers Collection*, *45, 1,* 41-52. DOI: 10.25944/znmwse.2020.01.4152.

17. Mwelu, N., Moya, M.B. (2014). Outsourcing practices and profitability levels of manufacturing firms in Uganda. *European Journal of Business and Management, 6,* 19.

18. Niewiarowski, J. (2013), *Schematy wewnątrzgrupowe. Statystyczny drogowskaz. Praktyczne wprowadzenie do wariancji*. S. Bedyńska, M. Cypryańska (eds.). Warszawa: SEDNO, 107-108.

19. Notoria Serwis, https://ir.notoria.pl/.

20. Stanisz, A. (2007). *Przystępny kurs statystyki II*, Kraków: StatSoft, 41.

HUMAN RESOURCE MANAGEMENT IN THE CONTEXT
OF INDUSTRY 4.0

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Abstract: The purpose of the article is to answer the following research question: What will change in particular elements of Human Resource Management be in the context of Industry 4.0? To achieve the defined purpose, literature studies and empirical research (based on focus group interviews with HR specialists) were used. Such HRM issues as the future of jobs, competencies required from employees and technological progress in HRM are discussed in the subject literature. The paper indicates the need to analyze changes in relation to particular elements of HRM and different groups of employees. It also presents some controversial scenarios of HRM's future and indicates directions for further research.

Keywords: human resource management, Industry 4.0, Fourth Industrial Revolution.

1. Introduction

Something that most clearly distinguishes modernity from all preceding periods is the unbelievable dynamism (Giddens, 2001). Nowadays, we are dealing with a truly energized era of change in the world of technology introduced by the Industrial Revolution 4.0. The Fourth Industrial Revolution is a concept regarding the use of automation and both data processing and exchange, as well as the implementation of various new technologies that allow the creation of so-called cyber-physical systems and changes in manufacturing processes. It also concerns the digitization of production, where devices and technological systems are connected with each other, including via the Internet, and where large amounts of production data are analyzed. We can consider Industry 4.0 to be a conceptual aggregate that includes a number of new technologies – including the Internet of Things, cloud computing, Big Data analysis and artificial intelligence, as well as incremental printing, augmented reality or cooperating robots (Mychlewicz, and Piątek, 2017).

When one compares it with previous Industrial Revolutions, one can find dramatic differences between the fourth Industrial Revolution and the other three. In its scale, scope and complexity, the transformation will be unlike anything humankind has experienced before.

The Fourth Industrial Revolution is "not merely a prolongation of the Third Industrial Revolution, but rather a new and distinct revolution" (NICVA, 2019, p. 4). It is introducing technologies that blur the lines between the physical, digital and biological spheres across all sectors. Technologies like artificial intelligence, nanotechnology, quantum computing, synthetic biology and robotics will all drastically supersede any digital progress made in the past 60 years and create realities that were previously unthinkable. Such profound realities will disrupt and change the business model of each and every industry (Hinton, 2018).

These changes apply to everyday life and ways of performing work. This because organizational systems do not exist without humans (Latham, 2017). Therefore, managing people (human resources management, HRM) can be considered the key management area. This includes such activities as recruitment and selection, training and development, HR appraisal (HR performance management), renumeration (compensation management) and HR flow (career management).

As Whysall, Owtram and Brittain (2019, p. 118) state, "the speed of technological change brought about by Industry 4.0 had created a significant gap between current capability of employees and the rapidly evolving requirements of their roles, prompting a need to consider new and more effective approaches to human resources development". The authors focused on engineers treated as knowledge workers. But one can state that there are more challenges in HRM related to Industry 4.0 than simply training and developing employees. They can be discussed after they are divided into the particular HR activities mentioned above.

The purpose of the article is to answer the following research question: What will change in particular elements of Human Resource Management be like in the context of Industry 4.0? To achieve the defined purpose, literature studies and empirical research were used. The project is financed by the Ministry of Science and Higher Education in Poland under the programme "Regional Initiative of Excellence" 2019 - 2022 project number 015/RID/2018/19 total funding amount 10 721 040,00 PLN.

2. Research methods

The first research method that was used for the purpose of this article is literature studies. In a literature review, researchers describe, evaluate and clarify what is already known about the research area. The author used a stand-alone review (Easterby-Smith, Thorpe, and Jackson, 2015), in order to provide an overview and synthesis. A review of subject literature was carried out by analyzing the databases available in the Library of the Wroclaw University of Economics (including Web of Science and Scopus). Such keywords as "The Fourth Industrial Revolution", "Industry 4.0" and "Technological Innovation" were used in combination with "Human Resource Management" and "Labor Market". The focus was placed on academic papers

(in Polish and English). Additionally, the author used the Google search engine in order to find business reports and articles about the analyzed phenomena.

The second research method was focus group interview. This method is rarely used by Polish researchers. Its most common application is in the area of marketing research (Drapikowska, Palczewska, 2013). The applied method involves acquiring qualitative data during an informal discussion on a specific topic, between selected persons. This conversation must relate to situations, objects or information that are known to the respondents (Litosseliti, 2005, p. 13). In accordance with Drapikowska & Palczewska (2013, p. 74), in all definitions of a focus group interview it is emphasized that:

a) the group is small (from 6 to 10 people) and is relatively homogeneous,
b) the group is an informal gathering that has been deliberately chosen,
c) the group is run by a qualified moderator who uses certain methods and practices in order to obtain the respondents' true opinions,
d) the focus group does not produce quantitative information,
e) the purpose of a focus group interview is to record all the behaviors that accompany the respondents' answers.

The main advantages of the focus group technique are the relatively short time needed to gather relevant information and the opportunity to observe the dynamics of participants' attitudes and interaction between them.

In accordance with the methodological guidelines, three interviews focused on the same group of respondents, consisting of six people (HR specialists) were carried out in June and July 2019. The interviews were more than four hours long. This means that the author used extended, mini focus group interviews with experts. The study was conducted – in accordance with the British style, in natural conditions, and the author of this article played the role of moderator. The natural environment, i.e., the moderator's home, stimulated the openness of respondents.

Due to methodological shortcomings, including the unrepresentativeness of the sample, the value of a focus group interview has been repeatedly questioned. However, it was found that this method may prove to be very useful during the conceptualization phase of any study, and through its application, the researcher may get help in formulating hypotheses, research problems or conducting a pilot study (Drapikowska, Palczewska, 2013). Focus group interviewing offers an opportunity to explore issues that are not well understood or where there is little prior research on the topic (Nyumba, et al., 2018), as in the case of Poland. The detailed purpose of the interviews was to collect information about the expected changes in HRM activities related to the above-mentioned HRM elements. It is worth mentioning that different reports show that achieving the level of the Third Industrial Revolution is still a challenge for Poland (Iwański, and Gracel, 2016; Siemens, 2016; Low Business Quality, 2018). Therefore, it is valuable to discover how Polish HR specialists perceive the changes.

3. Results of literature studies

The problems and influence of the Fourth Industrial Revolution are being touched on up in the subject literature. The existing publications usually focus only on development of modern technologies and on some aspects of technological changes. Liao et al. (2017) state that in current research, attention has been paid to the concept of IT integration (e.g., vertical, company-wide and horizontal connection of IT systems). It is clear that standardization of processes and resource productivity are the areas that attract most of the research efforts.

The analysis of journal databases indicates that the creation of demand for labor is the most frequently discussed problem, combining technological innovation with the labor market. Publications often list innovation as one of many factors influencing the demand for labor. It is worth mentioning that J. M. Keynes described technological unemployment as unemployment caused by the discovery of ways to economize the use of labor outrunning the pace at which new uses for labor can be found (for more see: Rifkin, 1995). In different reports one can find that the number of jobs for unqualified people will be reduced in the future, whereas the demand for highly competent people should increase (Piwowar-Sulej, 2018). According to McKinsey, due to the vast advancements in automation, up to 375 million workers may need to change their occupational category and up to 800 million individuals may be displaced by automation by 2030 (Hinton, 2018). However, publications from the last ten years, more often than in the literature published earlier, focus on a positive approach to the "technology – labor market" relationships. For example, Ugur, Churchill and Solomon (2018) discuss the correlation of technological innovation on employment, showing that the impact of innovation on employment growth is positive, if small and highly non-uniform. Furthermore, Degryse (2016) points out that there are also less qualified jobs with the least risk of automation, e.g., social workers and hairdressers.

Moreover, one can find three alternative scenarios of the technological impact on the future workforce (McGowan, 2018). In scenario one, automation will act as an optimizer. Ideally, robotics or artificial intelligence will serve two purposes: to expand the enterprise and to serve the workforce. If companies use automation and advanced data for these ends, Industry 4.0 will optimize the future of work, to improve rather than replace employment conditions and opportunities. Therefore, the subjects of academic interest cover such HRM issues as preparing employees for new challenges related to the technological changes (Piwowar-Sulej, 2018a; Whysall, Owtram, and Brittain, 2019). Employers should, hence, focus on the competencies required to achieve their business objectives so as to remain competitive and agile, and this requires them to ensure their employees undergo the necessary training to fill these competency gaps. In addition, employees need to acquire competencies "on demand" in order to adapt to their changing roles and responsibilities (Hinton, 2018).

Hecklau et al. (2017) conducted a meta-study-analysis of future competencies in Industry 4.0. A summary of their findings is presented in Table 1 with the focus on competencies that were mentioned in at least three studies.

Table 1.
The most important social, methodological, domain-related and personal competencies for Industry 4.0

Type of competency	Particular competencies	Explanation
Social	Communication & Co-operation	Service-orientation demands good listening and presentation skills. Increasing virtual work requires sufficient virtual communication skills.
Methodological	Analytical competence	Structuring and examining large amounts of data and complex processes is becoming mandatory.
	Complex problem solving	Employees must be able to identify sources of errors and be able to improve processes.
	Decision making	Responsibilities are shifted to the process level. More decisions have to be made independently.
Personal	Willingness to learn	Changing situations do not create any problems. Failure can be learnt. Within a reasonable period of time, new knowledge and skills can be obtained that enable the person to perform other tasks.
Domain	Digital networks	Working in a highly globalized and intertwined value chain requires knowledge networks.
	Digital security	Virtual work on servers or platforms obligates employees to be aware of cyber security.
	Coding competence	The growth of digitized processes creates a higher need for employees to understand and write code.
	Process understanding	Higher process complexity demands a broader and deeper process understanding, thinking and acting in networked and cross-cutting processes.
	Interdisciplinary competence	The increasing complexity of work requires multiple competence sets and knowledge.

Source: based on Hecklau et al. (2017, p. 168-169).

In scenario two, cooperation will replace automation as a priority for Industry 4.0. In this scenario, the workforce will have a voice. This scenario encourages organizations to engage the workforce, not alienate it. It envisions building on best practices from the technology companies that actually produce some of the tools that could disrupt the workforce. It engages labor organizations and governments to develop new workforce strategies together.

Finally, in scenario three, the digital transformation will lead workforce transformation. Automation will find its own level of expertise. That level might exceed human ability in many cases, but human ability need not be devalued. In scenario three, there is a strong argument that specific human skill sets will become even more important in Industry 4.0. As Trompisch (2017) states, the advancing use of Industry 4.0 technologies will not lead to a complete automation and a resulting competitive struggle between humans and machines, but it raises the question of the best possible cooperation between humans and machines.

New opportunities for IT tool implementation in HR processes are discussed in the subject literature as well (e.g., Onik, Miraz, and Kim, 2018). According to Sivathanu and Pillai (2018), emerging technologies such as the Internet-of-Things and artificial intelligence will automate

most of the HR processes – changing HR services into a Smart HR concept. This would allow HR departments to play a more strategic role. Table 2 presents how particular elements of HRM are supported by traditional IT and how it will be supported by ubiquitous computing technologies. A traditional technology is characterized by interactions based on IT devices that assume a fixed physical relationship between the employee and their work environment, while ubiquitous computing technology is characterized by interactions based on sensors and devices embedded in products, processes, individuals and buildings, and on unlimited access to computing, data and communication networks from any location at any time. Context-aware technology is alert to an employee's physical surroundings, as well as his/her cognitive and social states, and takes decisions in a proactive fashion, anticipating the employee's needs.

Table 2.

Approaches to particular HRM elements supported by traditional and ubiquitous computing technologies

HRM elements	Supported by traditional technology	Supported by ubiquitous computing
Recruitment and selection	It is based on attracting and selecting capable employees through media advertising, broadcast postings, yield pyramids, staffing graphs, onsite testing, face-to-face interviewing.	It is based on individuals and companies exchanging continuous data through social media, mobile devices, electronic boards and other means that create a mutual awareness to transmit the right message to the right person at the right time.
HR Appraisal	Periodic performance appraisals are based on historical tracking, behavioral checklists, graphic rating scales and behaviorally anchored rating scales.	It is based on instant and on-demand appraisal, guidance, support and alerts enabled by digital traces of embedded and context-aware technologies tracking work, as well as of roaming employees. Software manages job evaluation.
Training and development	New employees learn from experienced ones through in-house, face-to-face instruction, lectures, simulations or programmed instruction, as well as through apprenticeship programs whose focus is on-the-job training.	It is based on access to instantly available knowledge, on-demand development of skills and intellectual abilities through boundaryless delivery of instruction materials, virtual reality simulations, asynchronous training, educational games, chat rooms and knowledge-management systems.
Renumeration	Pay systems are based on manual job evaluation, pay-survey analyses spreadsheets to analyze bonus and commission structures.	Software manages pay-survey analyses, complex bonus and commission structures, reports, and analytics. Pay is based on specific work output.
HR flow	It is based on a joint effort of employee and company in matching career goals through career-path planning, in-house library, intranets for career self-service and online self-assessments.	It is based on employee-centric career arrangements in recognition of the fact that wants and needs vary over the span of an individual's career. Untethered workers are able to perform tasks anywhere at any time.

Source: based on (Cascio, and Montealegre, 2016, pp. 366-367).

According to the latest forecasts, the global HR software market is expected to grow in the years to come by 2.4% annually and to reach a value of 9.2 billion $ by 2020 (Marketanalysis.com, 2014). The use of IT tools not only enables companies to build new – more efficient – architecture of HR processes, but also to meet employees' expectations. New generations of employees (called "Z", "C" or "www") are coming. They have enormous expectations when it comes to companies' online presence and people's responsiveness.

4. Findings from empirical research and discussion

It is difficult to interpret the material collected due to the non-standardized nature of the focus group method. First, it is necessary to make a formative interpretation. This was done by preparing a list of discussed topics, identifying and naming them. Then the author identified common points in the discussion (similar opinions or experience) and finally typologized them. The findings from empirical research are shown in Table 3.

The first result of empirical study is the need to differentiate employees. One should not discuss the changes in HRM without taking into consideration different types of work and positions in an organization. The influence of Industry 4.0 will not be equal in relation to low skilled, medium skilled and highly skilled employees. For example, these days, only low skilled job candidates deliver their printed CVs to potential employers, and it will change. Moreover, companies are more likely to invest in attractive IT solutions when it comes to their key employees.

The point of view depends on the level of technological maturity of the current workplace, the region or the country. It is hard to imagine a digital future while dealing on an everyday basis with printed documents and phone calls or living in a place where problems with Internet access occur. Therefore, the common opinions of the respondents which are shown in Table 3 are based on their current experience, information from the media and own imagination.

Table 3.
Changes in HRM elements related to Industry 4.0 – results of focus group interviews

Element of HRM	Low skilled employees	Medium skilled employees	Creative jobs, highly skilled specialists, managers
Recruitment and selection	• No printed CVs • Broader utilization of modern technologies	• Broader utilization of modern technologies • Command of modern technologies as job requirement	• Increase in gamification-based solutions • Artificial intelligence used in Internet searches and delivering HR specialists obtain multidimensional information about candidates
Training and development	• Training in the use of new technologies	• Training in the use of new technologies • Training in Virtual Reality	• Training in the use of new technologies • Training in Virtual Reality • Knowledge "on demand" – artificial intelligence used in order to deliver customized knowledge
HR appraisal	• Digital control and measurement of job performance • Real-time performance data for both employers and employees	• Digital control and measurement of job performance • Real-time performance data for both employers and employees	• Faster recognition of the results of conceptual, creative work

Cont. table 3.

Remuneration	• More cafeteria remuneration	• More cafeteria remuneration. New line IT systems for building an individualized total compensation package • Bitcoin	• "Less cash-based rewards, more freedom/choice" • More cafeteria remuneration • New line IT systems for building an individualized total compensation package • Bitcoin • Combination of data "on demand" – artificial intelligence used in order to deliver market reports about compensation and benefits for different positions
HR flow	• In the direction of "less manual work, more steering" (e.g., in nursing)	• In the direction of new positions and new jobs (e.g., self-driving car mechanic; Internet-of-Things-based (individualized) equipment repair person)	• Broad individualization of careers • In the direction of new positions and new jobs (e.g., drone manager instead of fleet manager, e-coach)

Source: own empirical research.

As indicated before, the positive approach which links people with modern technologies is becoming more and more popular in the subject literature. The respondents during the focus group interviews also created a rosy vision of the future with technology supporting people – regardless of their position in the organizational hierarchy. For example, low skilled employees will perform less manual work and HRM will be focused on developing their skills related to the use of new technologies.

HR specialists strongly expressed their requirements in relation to HR appraisal processes. Real-time performance data for both employers and employees is needed and they hope that the future will bring appropriate solutions. They also imagine that in the future, IT systems will collect and analyze data from many sources related to the level of compensation and types of benefits offered to particular positions or jobs. This opinion is consistent with the view presented by W. F. Cascio and R. Montealegre. However, it is difficult to imagine tools that help control creative or conceptual work. Therefore, modern technologies should only speed up the delivery of feedback about results after implementing the employees' ideas.

One can find in academic and business literature the view that the employees are now more focused on purpose than ever before. Less driven by financial motivation, the new workforce is open to compensation that is not only about money. They would like to have an interesting, flexible and meaningful job and managers who will want to listen to their ideas (Schroth, 2019). They are "less interested in becoming rich than in gaining the experiences that will help them lead a life that is richer". At this point it should be mentioned that such opinions are based on research conducted on well-educated people. In business practice, there are still low positions where people do not earn much and money is important to them. That is why the traditional money-based remuneration approach will still exist. However, IT systems will help manage an individualized total compensation package for medium and highly skilled employees.

Some of the above-presented opinions are new and controversial. For example, the use of Bitcoin (cryptocurrency, a form of electronic cash) in the area of compensation management needs first of all to have its legitimacy. In turn, established artificial intelligence used in Internet searches and providing HR specialists with information about highly skilled candidates raises ethical concerns.

5. Conclusions

The subject literature provides a number of descriptions of the new reality, addressing various aspects of the incoming changes, including issues related to HRM. The future of jobs, the competencies required from employees and technological progress in HRM are being discussed. This article contributes to the knowledge about specific conditions of HRM in modern enterprises. It focuses on activities related to particular HRM elements and employees with different qualifications.

The paper also provides some practical implications. Having in mind the above presented ethical issues, it is worth emphasizing that not only the rapid development of IT, but also managers (including HR professionals) have influence on the shape and pace of changes – in the local and global scale (especially in global corporations). They should be well prepared for changes and aware of the advantages and disadvantages of applying different solutions. Furthermore, they should take into account, as indicated in this study, the level of technological maturity of the current workplaces, the region or the country and differences between qualifications.

The author is aware of the limitations resulting from the methodology of this research. However, the presented findings suggest directions for future research. The need occurs to discuss HRM changes whilst taking into account other differentiators of employees, e.g., organization of their work (individual vs. team work; traditional vs. tele-employees) and type of employment (traditional employment vs. contract with freelancers). Moreover, such factors as the legal system and culture play an important role in this area. It would also be interesting to conduct comparative research with HR specialists from different countries.

References

1. Degryse, Ch. (2016). *Digitalisation of the economy and its impact on labour markets*, Brussels: European Trade Union Institute.

2. Drapikowska, B., and Palczewska, M. (2013). Zogniskowany wywiad grupowy oraz techniki projekcyjne jako przykłady jakościowych empirycznych metod badawczych stosowanych w naukach społecznych, *Obronność. Zeszyty Naukowe Wydziału Zarządzania i Dowodzenia Akademii Obrony Narodowej, 3(7)*, 71-86.

3. Easterby-Smith, M., Thorpe, R., and Jackson, P.R. (2015). *Management and Business Research*. London: Sage Publication.

4. Giddens, A. (2001). *Nowoczesność i tożsamość. „Ja" i społeczeństwo w epoce późnej nowoczesności*. Warszawa: PWN.

5. Hecklau, F. et al. (2017). Human Resources Management: Meta-Study – Analysis of Future Competences in Industry 4.0. *Proceedings of the International Conference on Intellectual Capital, Knowledge Management & Organizational Learning*, 163-174.

6. Hinton, S. (2018). How The Fourth Industrial Revolution Is Impacting The Future of Work, *Forbes, Oct 19*, Retrieved from https://www.forbes.com/sites/theyec/2018/10/19/how-the-fourth-industrial-revolution-is-impacting-the-future-of-work/#7de0ddeb65a7, 2019.07.15.

7. Latham, J. (2019). *Without people organizational system don't exist*. http://johnlatham.me/psychology-stakeholders, 2019.07.20.

8. Law Business Quality (2018). *Druzgocący raport: czwarta rewolucja przemysłowa ominęła polskie fabryki?*, http://magazynlbq.pl/druzgocacy-raport-czwarta-rewolucja-przemyslowa-ominela-polskie-fabryki/, 2019.07.13.

9. Liao, Y. et al. (2017). Past, present and future of Industry 4.0 – a systematic literature review and research agenda proposal. *International Journal of Production Research, 55(12)*, 3609-3629. doi: 10.1080/00207543.2017.1308576.

10. Litosseliti, L. (2005). *Using focus groups in research*, Cornwall: MPG Books Ltd.

11. MarketAnalysis.com (2014). *Human Resources (HR) Software Market Forecast 2015-2020, Tabular Analysis (2014)*, http://www.marketanalysis.com/?p=338, 2019.07.01.

12. McGowan, R. (2018). Here are 3 alternative visions for the future of work. *World Economic Forum, 18 Dec. 2018*, Retrieved from https://www.weforum.org/agenda/2018/12/alternative-future-work-opportunity-fear-industry/, 2019.07.11.

13. Mychlewicz, C., and Piątek, Z. *Od Industry 4.0 do Smart Factory, Poradnik menedżera i inżyniera*. Retrieved from https://publikacje.siemens-info.com/pdf/76/Od%20Industry%204.0%20do%20Smart%20Factory.pdf , 2019.06.28.

14. NICVA (2019). *The Impacts of the Fourth Industrial Revolution on Jobs and the Future of the Third Sector,* https://www.nicva.org/sites/default/files/d7content/attachments-articles/the_impact_of_the_4th_industrial_revolution_on_jobs_and_the_sector.pdf, 2019.07.12.

15. Nyumba, T.O., Wilson, K., Derrick, Ch.J., and Mukherjee, N. (2018). The use of focus group discussion methodology: Insights from two decades of application in conservation, *Methods in Ecology and Evolution, 9*, 20-32, doi:10.1111/2041-210X.12860.

16. Onik, M.M.H., Miraz, M.H., and Kim, C.S. (2018). A recruitment and human resource management technique using Blockchain technology for Industry 4.0. *Proceedings of the Smart Cities Symposium (SCS-2018)*, 11-16, doi: 10.1049/cp.2018.1371.

17. Piwowar-Sulej, K. (2018). Human Resources Management in the Industrial Revolution 4.0: General and Polish Perspective. *Double-blind peer-reviewed proceedings of the international scientific conference Hradec Economic Days*, *8(2)*, 179-187.

18. Piwowar-Sulej, K. (2018a). Employee 4.0 from the competitive perspective. *Studia i Prace WNEiZ US*, *52/3*, 121-129, doi: 10.18276/sip.2018.52/3-12.

19. Rifkin, J. (1995). *The End of Work: The Decline of the Global Labour Force and the Dawn of the Post-market Era*. New York: Putnam Publishing Group.

20. Schroth, H. (2019). Are You Ready for Gen Z in the Workplace? *California Management Review*, *61(3)*, 5-18.

21. Siemens (2016). *Smart Industry Polska 2016. Raport z badań*, Retrieved from https://publikacje.siemensinfo.com/pdf/123/Raport%20Smart%20Industry%20Polska%20 2016.pdf, 2019.07.12.

22. Sivathanu, B., and Pillai, R. (2018). Smart HR 4.0 – how industry 4.0 is disrupting HR. *Human Resource Management International Digest*, *26(4)*, 7-11.

23. Trompisch, P. (2017). Industrie 4.0 und die Zukunft der Arbeit [The implications of Industry 4.0 on the future of work]. *Elektrotechnik und Informationstechnik, 134(7),* 370-373.

24. Ugur, M., Churchill, S.A,. and Solomon, E. (2018). Technological innovation and employment in derived labour demand models: a hierarchical meta-regression analysis. *Journal Of Economic Surveys, 32(1)*, 50-82, doi: 10.1111/joes.12187.

25. Whysall, Z., Owtram, M., and Brittain, S. (2019). The new talent management challenges of Industry 4.0. *Journal of Management Development*, *38(2)*, 118-129, doi:10.1108/JMD-06-2018-0181.

SUPPORT FOR DELOCALISATION PROCESSES BY LOCAL AUTHORITIES WITH A VIEW TO SUSTAINABLE DEVELOPMENT

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Abstract: Most of humankind live in cities. They therefore play a central role in development processes. Local authorities, through their efforts to attract external investors, try to actively strengthen these processes. Nowadays, it is important for development to be sustainable, both in terms of the environment and citizenship. This article presents the delocalisation processes from three perspectives: the company, the place where the processes are located (i.e. country, region or municipality) and the inhabitant (social capital). The processes are subject to investor acceptance. This win-win strategy, which benefits all three parties, will become the common feature of all delocalisation investment projects which involve the use of available human resources at the place of investment. At present, more invaluable than the low labour cost is the quality of human/social capital, both in context of adaptation to the needs of a specific entrepreneur and one expressed by social and civic awareness. The author defines the theory of stakeholders as the key determinant that should guide municipalities in attracting investors and implementing a sustainable development strategy. Additionally, the paper uses the method of analysis of the literature on the subject, legal documents and available reports.

Keywords: delocalisation processes, local development, sustainable development, human capital, building partnerships.

1. Introduction

Development, including economic development, has become its own goal over the last several decades. Successive industrial revolutions have blackened humanity on the course of development. Progress has undoubtedly brought much good to mankind, but unfortunately it has also had negative consequences, such as the location of the settlement or the diseases the effect the inhabitants. Therefore, for several decades, development has been combined with the issues of sustainable development, which is supposed to be understood as the shaping of reality in such a way that the needs of the present generation can be satisfied without compromising the chances of future generations to satisfy them.

Thus, delocalisation processes should be looked at from a new perspective. Traditionally, this phenomenon has two perspectives: companies that apply these processes and the places where the given processes are located, i.e. the location (country, region or municipality that accepts the investment). Topical literature suggests that there are a lot of works that describe and study these phenomena in a precise way; however, they usually focus on only one perspective.

Many works contain an analysis of the discussed phenomena only from the point of view of the company. This knowledge is essential in the process of making business decisions. For example, C.K. Prahalad and G. Hamel indicate, with the help of key competence concepts, which processes can/should be outsourced. They state that companies should focus on those areas that determine their competitive advantage, while others should be separated from the structure and transferred to other entities (Prahalad, & Hamel, 1990).

A model of offshoring and outsourcing explaining the choice of a specific organisational form of production fragmentation containing a set of factors, including elements related to costs, resources, monopoly advantage, learning and organisational strategy, is proposed by M.J. Radło (Radło, 2013).

M. Greaver presents a methodology for the implementation of outsourcing projects based on seven steps: planning; strategic implications study; cost analysis and execution; supplier selection and the negotiation of conditions and transfer of relationship management resources (Greaver, 1999).

M. Power et al. describe the methodology of outsourcing implementation in companies in seven similar stages, in the context of a repetitive relationship management cycle. Their work has a very practical dimension. It contains many examples and guidelines for managers implementing outsourcing strategies (Power et al., 2006).

Within the framework of the localisation perspective (in municipalities), a lot of research has been carried out analysing the importance of local authorities in the process of localisation selection by enterprises, emphasising their positive effects (Devereux et al., 2007, pp. 413-435; Barrios et al., 2006, pp. 81-107; Domański, 2001; Kraszewski, 2001; Dziemianowicz, 2008). However, in a majority of these cases, the studies relate to investments already implemented and not potential investments. This is due to the selection of a location. Until the location is revealed, this is not so much information constituting a company secret as an individualised unique process within the framework. Therefore, it can be assumed that the representatives of a given location do not have knowledge of the detailed criteria which constitute the basis for the decision on the choice of location. For this reason, among others, specialists cannot agree on the links between the decisions of companies on the choice of location in offshoring and outsourcing processes and the activities of local governments in attracting investors. However, the issue of supporting delocalisation processes by local authorities is well recognised and presented in many works.

The Handbook for Promoting Foreign Direct Investment in Medium-Size, Low-Budget Cities in Emerging Markets, published in 2009, as a result of research conducted by the Earth Institute of Columbia University in New York as part of The Millennium Cities Initiative (MCI), which is one of the Millennium Development Goals initiatives established by the United Nations, is considered to be of particular importance. It presents, in a comprehensive way, the mechanisms for building a system of acquiring investments at the local level. Under this system, special attention is paid to the proactive acquisition of investors through individualisation of an offer dedicated to a specific enterprise (Handbook…, 2009).

Moreover, a well-known approach is the acquiring of investors for municipalities written by W. Jarczewski. In a comprehensive way, he presents the system of local authorities' influence on the investors' location decisions and conditions of particular pro-investment activities, as well as the importance of local authorities' activity in the process of location selection by enterprises. It states that it is not individual activities carried out by the municipality that contribute to supporting the entrepreneurs' decisions on the choice of a particular location, but the implementation of the whole pro-investment system, including a number of components (Jarczewski, 2012).

On the other hand, this new perspective related to sustainable development also applies to the resident. It seems that the win-win strategy is the key determinant to be followed by municipalities. Companies carry out the processes of outsourcing and offshoring mainly due to the basic objective of economics, i.e. profit maximisation. On the other hand, local authorities take actions aimed at attracting investors who create new jobs for the benefit of the region, increase tax revenues and ensure their re-election, while the inhabitants are a passive component of these processes (in the context of direct influence on decision making). The key to the success of the relationship created between investors and public authorities should not only be mutual understanding of each other's interests but should also including residents as active participants in this process.

A certain proposal in this respect may be to create a system of acquiring investors beneficial for all parties. The most important element of which should be an individualised investment offer from a given municipality for a specific investor, tailored to its needs based on optimal location criteria, as defined by the entrepreneur. However, such a situation is rare due to the fact, as noted above, that the process of selecting a location by an enterprise is unique for each investment project.

On the other hand, a common feature of all investment projects involving offshoring and outsourcing is the use of human resources at the place of investment. Currently, what counts more than the low cost of employees is their quality in terms of adaptation to the needs of a particular entrepreneur. This quality manifests itself primarily as social capital.

It is generally accepted that social capital is the basis of civil society, which is characterised by the self-awareness of its members of the needs of that community and the desire to meet them, resulting in interest and responsibility for the affairs of that community.

A low level of social capital affects the small number of ties that exist between people. This results in fewer people knowing each other, and even if people do know each other, they will not trust each other. The result of this situation is a lack of joint or individual action aimed at improving life in the community. On the other hand, a high level of social capital occurs when people have and create good relations with other members of the community, trusting each other and collectively undertaking actions aimed at improving living conditions. In economic terms, a high level of social capital translates into easier negotiations, lower transaction costs, reduction of corruption, the spread of knowledge, the development of civil institutions (the third sector) in the context of the control of public authorities, as well as the favouring of long-term investments (Fukuyama, 2013, p. 169).

It is also worth noting that the quality of social capital has a very strong impact on the self-awareness of residents in the context of education, including the need for further education, which directly translates into greater employee efficiency.

Therefore, an element of a system beneficial for the three parties (entrepreneurs, municipalities and inhabitants) may be building partnerships for pro-investment activities in a given municipality, especially in the area of education and building social capital.

This text has been prepared on the basis of available literature, results of market research carried out by professional institutions, legal regulations, as well as on the basis of the author's own observations and experience gained in his professional work in a unit dealing with acquiring and servicing investors in the local government and in an advisory and training organisation preparing staff for the needs of entrepreneurs.

2. The influence of decision makers on the location processes of companies

Although the classical approach to location theory does not take into account the role of local authorities in influencing location factors, we have been observing an increase in the activity of local authorities in promoting their municipalities for several years. These activities include both tourism and economic dimensions. In particular, the latter dimension begins to play a leading role in activities undertaken by local governments. The flagship motto of politicians around the world is to create new jobs.

On the one hand, the influence of local decision makers on business location decisions cannot be overestimated, as according to the location criteria, local authority activities generally take up distant places in terms of their importance. On the other hand, when deciding between two similar locations (similar location parameters, infrastructure, etc.), the influence of local authorities can be significant.

It is also worth noting that the role of local authorities is different, depending both on the size of a given local government community and on the investment sector. Usually, in small municipalities, it is much easier to obtain investment areas by a self-government, mainly due to their price. It is assumed that such municipalities address their investment offer preferably to investors from the production sector and their influence on possible location decisions, which is much greater than that of authorities of large cities of so-called metropolises. This is due to the fact that large cities themselves are attractive for the location of business mostly in the service sector (agglomeration effect). The dynamic development of the BPO/IT/SSC (Shared Service Centre) sector in Poland is by no means due to the local government. The examples of Kraków and Warsaw prove this best. Both these cities do not have an active policy in terms of attracting investments from this sector, and yet it is in these cities that the sector is concentrated in Poland. The natural state of affairs is the development of infrastructure and social capital in large cities needed for modern services. The existence of convenient road and air transport, the possession of educated human resources (the status of academic cities) and the functioning of a large office space market are features of all metropolises around the world.

3. Strategic approach - a vision of local development

A feature of the 20th and 21st centuries is the processes associated with the decentralisation of power. It is assumed that the closer the power is to the citizens, the more effectively individual policies (understood as comprehensive programmes concerning particular areas of inhabitants' lives) can be implemented for a given community. Decentralisation also entails equipping the lower levels of public administration with instruments to carry out their tasks. Of course, it is crucial here to provide the local authority with financial means with which it can carry out its tasks for the benefit of the local community. The consequence of this phenomenon is the way in which these tasks are performed, i.e. management. It is worth noting that over the last few decades, the very term of local community management has evolved. Initially, it meant administration and carrying out tasks commissioned from central authorities; nowadays, it means policymaking and management. This new scope of management is particularly important in the case of direct elections of mayors and municipality leaders. They have a strong directive to implement this policy after elections (Fukuyama, 2013, p. 169).

The key of all actions is a precisely defined goal, corresponding to a certain vision. Without a set objective, it is very difficult to implement activities such as attracting investors. The basic factor in this area is time and consistency of action. The vision of the development of the place where the municipality is to be located in a certain period of time obviously results from internal and external conditions. It is difficult to imagine the construction of an office park complex attracting investors from the research and development sector in a municipality with 2000

inhabitants, 100 kilometres away from a bigger city centre. On the other hand, the vision of creating a 200-ha logistics park near the eastern border of Poland in a municipality where there is a 20% unemployment rate is more realistic, assuming the existence of, or plans to build, an international road transport route in this area. The latter vision, with the use of appropriate tools and determination of local authorities, is possible to achieve. One of the conditions for its implementation is to prepare a strategic document (Kondratenko et al., 2020).

It should be noted at this point that there is not an unlimited number of external investors; therefore, it is not possible to fill all investment areas with them. This means that not all municipalities which have defined their strategic vision will achieve success through their actions. On the other hand, activities aimed at improving the investment climate may also result in the release of enormous energy among local entrepreneurs. Of course, according to the theory of foreign direct investment, external investors create new jobs directly and indirectly (through the multiplier effect), and thanks to them, the level of domestic investment increases, they bring know-how, increase productivity and provide access to new technologies and innovations. However, these phenomena can also occur thanks to local entrepreneurs. The simplest example of actions taken by local authorities to build an investment offer for external investors is the adaptation of education in local educational institutions to the labour market. These actions are also beneficial for local entrepreneurs, as economic development, and therefore social welfare, depends on the level of competence of employees (Skupiak, 2013).

To sum up, it should be stressed that, nowadays, the coordination and development area is of great importance in formulating a vision, as it creates a network of partnerships within a given municipality. Investment processes are increasingly complex, and both national and global economies are determined by interdependencies. The sum of resources of all municipality stakeholders allows for the building of a better strategy. The more stakeholders in the municipality involved in creating a vision, the more effectively this vision can be implemented. Moreover, such activities are in line with the trend of developing social participation as a way of municipal management. The involvement of stakeholders in the planning process is, by nature, multi-faceted and gradual. Literature emphasises that participation is a certain continuum - a degree of development - of activity between authorities and stakeholders, which can be scaled according to the following stages: informing the society; listening to the society; involving the society; developing agreements/partnerships (Creighton, 2012).

4. Resource analysis

Each analysis of resources must be preceded by a precise socio-economic diagnosis of the municipality. This is a very important element of creating a vision, as it is assumed that the existing advantages should be strengthened and not at any cost planned for the development of the municipality against internal and external conditions. The scope of the diagnosis should include:

–   General characteristics of the municipality against the background of the region.
–   Demographic structure.
–   Economic structure.
–   State and protection of the environment.
–   Waste management.
–   Technical infrastructure, including telecommunications.
–   Housing management.
–   Road infrastructure.
–   Education.
–   Culture, sport and recreation.
–   Characteristics of the third sector.
–   Human capital and labour market.
–   Health and safety protection.

An interesting example of defining the areas of analysis is the methodology of PwC (PricewaterhouseCoopers) used in the study of Polish metropolises. According to this methodology, the analysis areas are grouped into seven development assets (Raport…, 2012):

1) Financial Source Assets, which show to what extent the city is able to find funds necessary to finance development.

2) Institutional and Democratic Assets, which show the efficiency of city institutions and civil society activity.

3) Technical and Infrastructure Assets, which show the city's infrastructure: housing, transport, accessibility, modern services and media.

4) Investment Attractiveness Assets, which show the city's potential to attract domestic and foreign investors.

5) Culture and Image Assets, which show whether the city is perceived as an interesting and culturally attractive place.

6) Human and Social Assets, which define the quality of human resources: knowledge and qualifications, demographic structure, pro-market attitude encouraging economic activity.

7) Quality of Life Assets, which show the living conditions offered by the city: the state of the environment, the level of health care, education, safety, traffic.

The above resources belong to internal conditions; however, it is also very important to analyse external conditions, which have an increasing impact on all development processes. The external conditions include:

- International environment – general social and economic situations, directions and priorities for the development of the European Union, global policy priorities, current transnational phenomena (e.g. migration problem).
- National and regional environment – sectoral and industry policies, the general political situation.
- Economic environment – dynamics of economic development, programmes supporting the development of small and medium-sized enterprises, economic development policies, active forms of combating unemployment.
- Social environment – changes in lifestyle, consumption preferences, forms of spending free time, counteracting the social exclusion of citizens and families in a difficult life situation.
- Technological environment – innovative processes, new technologies, trends in modernisation of production processes.
- Legal environment - political and legal basis for the functioning and development of the state, society, local government.
- Ecological environment - directions and priorities of social, organisational and technical activities for the protection of the natural environment and prevention of its degradation.

5. Building partnerships towards the quadruple helix

In the modern world, we can observe dynamic processes resulting in interdependence. Building an effective vision of development and its implementation seems impossible without building appropriate partnerships and the involvement of many entities. However, various actors who are involved in the development processes of a municipality must achieve certain benefits in order for this involvement to be real. This phenomenon is explained by the theory of stakeholders, whose most famous promoter is the American economist R.E. Freeman.

The most important assumptions of the Stakeholder Theory are (Freeman, 1984):
- The existence of many groups of stakeholders who are interested in assessing the functioning of an entity (e.g. municipalities).
- A given entity enters into relations with many stakeholder groups.

- Focusing on the nature of relationships, both in the areas of processes and results for the organisation.
- The interests of all eligible stakeholders have an important value, and none of them should dominate the others.

On the other hand, the purpose of the stakeholder analysis is to identify and assess the type and scope of influence in different types of interest groups (stakeholders) shaping the organisation's strategy of operation in the case of a municipality interest. The aim of this activity is to explain and analyse the expectations and behaviours of stakeholders, the relations between them and the organisation, the directions and possibilities of their influence on changes in the organisation's goals, as well as its functioning and effectiveness. A stakeholder analysis aims, first of all, at getting to know groups, business entities or institutions that are strategic partners of the organisation, determining the nature of relations that take place between them and their partners, and secondly, identifying instruments or decisions with which they exert or intend to exert influence over the organisation.

This method is a procedure of systematic collection and processing of qualitative data to define whose benefits should be considered when creating and implementing activities. It also serves to identify and evaluate people, social groups and institutions which are key to the project or undertaking and have a decisive influence on the operationalisation of activities.

In order to analyse the stakeholders in the scope of undertaking pro-investment activities by the municipality, after their identification, the following features are examined (Freeman, 1984):

- Stakeholder knowledge about the pro-investment activities and their importance.
- Benefits for individual stakeholders.
- Support or lack of support for these activities.
- Potential alliances between stakeholders, as well as the ability to influence the process of implementation of the pro-investment policy of the municipality.

Moreover, the impact, i.e. the strength with which the stakeholders can influence the implementation of the pro-investment policy of the municipality, is assessed. It manifests itself primarily in the ability to control the decisions made, the possibility to facilitate the implementation of activities, as well as the negative dimension, i.e. the possibility to block these activities.

On the other hand, the importance of stakeholders is a parameter which indicates the importance that has been assigned to the satisfaction of the needs and benefits of a given stakeholder resulting from the implementation of the measures.

The importance of stakeholder impact depends on:

- Formal authorities.
- Authority.
- Control over strategic project resources.

- Expertise.
- Negotiating position.
- Economic, social and political status.
- Influence on other stakeholders.

Building partnerships for municipality development is nothing more than shaping relations with stakeholders. Thanks to this analysis, the hierarchy of importance of the municipality's interest groups is established, and the potential tools for influencing them are defined. These tools primarily include public relations, i.e. creating a positive image of the municipality and its host as a partner for all stakeholders (Comp.: McFarland, & McConnell, 2011, p. 11).

Constant communication is crucial in the process of managing stakeholder relations (Hund, & Engel-Cox, 2002, p. 228). It is also very important to introduce elements of risk management in the area of shaping stakeholder relations, which consists primarily in eliminating potential conflicts or preparing for them.

A. Svendsen points out the following stages of building stakeholder relations, which can be attributed to the municipality's prior investment activities (Svendsen, 1998, p. 67):

1) Creation of foundations (e.g. selection of strategic directions, defining the mission, vision and values of the municipality in the context of attracting investors and support for internal involvement).

2) Reorientation of the organisation (municipality office and its subordinate institutions) – identification of potential gaps and deficiencies, evaluation of the system and structure and introduction of necessary changes.

3) Formulating a strategy (primarily in the aspect of attracting investors to the municipality).

4) Building trust between all activity stakeholders (information exchange, communication, identification of common goals, identification of conflict areas, providing resources).

5) Evaluation and repetition of those stages which require development and enhancements.

It is of key importance to identify and include inhabitants of the municipality as a group of stakeholders (today – NGOs, municipal activists; tomorrow – all inhabitants through municipal information systems). On the one hand, the activation of this stakeholder group may counteract the commonly occurring phenomena, such as: social atrophy of the inhabitants and migration movements to larger centres, and it may contribute to the construction of high quality social capital, including the much-needed creative class (Florida, 2010), the engine of economic growth.

6. Summary

In the 21st century, most business processes are developed using advanced technology and highly skilled employees, yet traditional industries continue to use cheap labour, mainly in developing countries.

At this point, it is worth noting how China is traditionally treated as a huge reservoir for cheap labour. However, there has been increasing pressure placed on raising labour costs, due to the formation of the middle classes, and their aspirations coinciding with their demands. The Chinese authorities are preparing to celebrate the centenary of the Chinese Communist Party (est. 1921). They are also celebrating the building of a "moderate welfare state", i.e. the middle class (Góralczyk, 2018).

Increasingly, simple production processes are performed by robots in the context of the fourth industrial revolution (Economy 4.0), so it seems that the key factor in attracting investors is ensuring access to qualified personnel.

In the traditional approach, municipality authorities were passive in relation to this issue. Building partnerships between local authorities and institutions of the education sector gives this aspect a dynamic dimension.

Both in the case of small municipalities and large cities, the local authorities have great opportunities to influence and create partnerships with primary and secondary schools in the context of building staff potential. Firstly, these schools often report directly to the local government units, which are the leading body for them. Secondly, the quality of education and the fate of graduates depends on the interest of potential new students (candidates for these schools). In Poland, large cities allocate about half of their budget to education, so the impact can be very high if there is an appropriate partnership based on mutual understanding of the objectives and benefits for all parties.

In many cases, the institutions of the educational system are subordinate to the local government and are characterised by a low level of knowledge about the pro-investment activities of the municipality, having a neutral attitude towards this. This means that there is a large space for including these institutions in the pro-investment policy of the municipality, due to the great possibilities of their influence as entities that prepare staff for investors by including them in the process of adjusting the educational offer to the needs of the labour market.

The construction and quality of partnerships in the area of pro-investment activities of a municipality – and thus its effectiveness – are much less affected by local authorities in the case of higher education institutions, which are not only independent from them but also fully autonomous. In this case, only mutual understanding of their interests can bring the expected benefits.

Moreover, there is a certain analogy in terms of building partnerships with the triple and quadruple helix concepts, which are the basis for the development of modern cities. They are based on cooperation and the search for collaborations between three (triple: administration, business, science) or four stakeholder groups (quadruple: additionally, residents/civic society) (Lombardi et al., 2012, pp. 137-149).

In the 21st century, human capital and its quality (inhabitants/civic society), in particular, play a key role in development. This is related to the new development paradigm of countries and regions, i.e. building a knowledge-based economy. One of the most popular definitions of human capital is that developed by the OECD. Within this definition, human capital is understood as "the knowledge, skills, abilities and other qualities of the human being which enable the production of personal, social and economic well-being (Boris et al., 2006, pp. 81-107)".

As early as 1962, Nobel Prize winner George Becker introduced the concept of investing in human capital as a way of allocating resources that influences future income. By investing in assets, he understood education and gaining experience at work through training or collecting information about the world around him. This is not only still valid, it is a condition for development, but more importantly, it can be a condition for survival (Comp: Kuzior, 2010; Kuzior 2014a, 2014b, 2014c).

References

1. Barrios, S., Gorg, H., Strobl, E. (2006). Multinationals' location choice, agglomeration economies and public incentives. *International Regional Science Review, 29,* 81-107.
2. Creighton, J.L. (2012). *The public participation handbook.* San Francisco: Wiley.
3. Devereux, M., Griffith, R., Simpson, H. (2007). Firm location decisions, regional grants and agglomeration externalities. *Journal of Public Economics, 91*, 413-435.
4. Domański, B. (2001). *Kapitał zagraniczny w przemyśle Polski: prawidłowości rozmieszczenia, uwarunkowania i skutki.* Kraków: Instytut Geografii i Gospodarki Przestrzennej Uniwersytetu Jagiellońskiego.
5. Dziemianowicz, W. (2008). *Konkurencyjność gmin w kontekście relacji władze lokalne – inwestorzy zagraniczni.* Warszawa: Wydawnictwa Uniwersytetu Warszawskiego.
6. Florida, R. (2010). *Narodziny klasy kreatywnej.* Narodowe Centrum Nauki.
7. Freeman, R.E. *Strategic Management: A stakeholder approach.* Boston: Pitman.
8. Fukuyama, F. (2003). Kapitał społeczny. In: L.E. Harrison, S.P. Huntington (eds.), *Kultura ma znaczenie.* Kraków: Zysk i S-ka.
9. Góralczyk, B. (2018). *Wielki renesans. Chińska transformacja i jej konsekwencje.* Warszawa: Dialog.

10. Greaver, M. (1999). *Strategic Outsourcing A Structured Approach to Outsourcing Decisions and Initiatives.* AMACOM.

11. *Handbook for Promoting Foreign Direct Investment in Medium-Size, Low-Budget Cities in Emerging Markets, Millenium Cities Initatives* (2009). New York: Columbia University.

12. Hund, G.E., Engel-Cox, J.A. (2002). Two-Way Responsibility. In: J. Andriof, S. Waddock, B. Husted, S.S. Rahma (eds.), *Unfolding Stakeholder Thinking.* Sheffield: Greenleaf Publishing.

13. Jarczewski, W. (2012). *Pozyskanie inwestorów do gmin.* Warszawa: Wolters Kluwer business.

14. Kondratenko, V., Okopnyk, O., Ziganto, L., Kwilinski, A. (2020). Innovation Development of Public Administration. *Management and Legislation Features, 1.*

15. Kraszewski, W. (2001). *Przedsiębiorstwa z udziałem kapitału zagranicznego w Polsce w latach 1990-1999 (miejsce w gospodarce kraju, czynniki i perspektywy rozwojowe).* Wydawnictwo Uniwersytetu Mikołaja Kopernika w Toruniu.

16. Kuzior, A. (2014b). *Aksjologia zrównoważonego rozwoju.* Bańska Bystrzyca: UMB Belianum.

17. Kuzior, A. (2014a). Dekada edukacji dla zrównoważonego rozwoju. *Zeszyty Naukowe, seria Organizacja i Zarządzanie, 72.* Politechnika Śląska.

18. Kuzior, A. (2014c). Development of competences key to sustainable development. *Zeszyty Naukowe, seria Organizacja i Zarządzanie, 75.* Politechnika Śląska.

19. Kuzior, A. (2010). Polskie i niemieckie doświadczenia w projektowaniu i wdrażaniu zrównoważonego rozwoju. *Problemy Ekorozwoju, 5, 1.*

20. Lombardi, P., Giordano, S., Farouh, H., Yousef, W. (2012). Modelling the smart city performance. *Innovation: The European Journal of Social Science Research, 25, 2.*

21. McFarland, K.C., McConnell, J.K. (2011). *Strategies for globally competitive cities. Local roles in Foreign direct investment and International Trade.* Washington, DC: Center for Research and Innovation; National League of Cities.

22. OECD (2001). *The Well-being of Nations, The Role of Human and Social Capital.* OECD Publishing.

23. Power, M., Desouza, K., Bonifazi, C. (2006). *The Outsourcing Handbook: How to Implement a Successful Outsourcing Process.* Kogan Page Limited.

24. Prahalad, C.K., Hamel, G. (1990). The core competence of the corporation. *Harvard Business Review, 68, 3*, 12.

25. Radło, J. (2013). *Offshoring i Outsourcing Implikacja dla gospodarki i przedsiębiorstw.* Oficyna Wydawnicza SGH.

26. Skupiak, B. (2013). Edukacja jako czynnik wspierający rozwój gospodarczy. Implikacje dla Polski. *Studia Ekonomiczne. Zeszyty Naukowe Uniwersytetu Ekonomicznego w Katowicach, 129.*

27. Svendsen, A. (2998). *The Stakeholder Strategy. Profiting from Collaborative Business Relationships*. San Francisco: Berrett-Koehler Publishers.

28. Swianiewicz, P., Klimska, U., Mielczarek, A. (2004). *Nierówne koalicje – liderzy miejscy w poszukiwaniu nowego modelu zarządzania rozwojem*. Warszawa: Scholar.

GLOBAL COMPETENCE: A PREREQUISITE FOR A GLOBAL LABOR MARKET AND A CHALLENGE FOR EDUCATION

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Abstract: The aim of the article is to recognize the essence of global competence for effective functioning on the global labor market. Global competence is understood as the ability to interact effectively in international and intercultural environments. The concept of global competence is based on mutual respect and an attitude of openness to cultural diversity. Presented study refers to the significance and necessity of global competence analyzed in literature concerning contemporary educational challenges.

Keywords: global education, education, globalization, labor market.

1. Introduction

The aim of the article is to discuss the concept of global competence and contribution of education in challenging the issues of sustainable development. A global competence as a multidimensional capacity responds to the requirements induced by socio-economic changes, such as the increasing role of migration, culturally diverse teams and intercultural encounters. The concept of global competence is examined in the context of the changing environment of the global labor market and the requirements that contemporary employees should perform. The study has a theoretical character and is based on literature analysis.

2. Globalization and education

The question of education and development is still the most important in terms of fundamental changes people face in the stage of "liquid modernity" (Bauman, 2010, p. 1). The more globalized and fragmented the world is – the greater is the role of education in challenging the issues of social cohesion, inclusion and democratic participation. Globalization,

according to Giddens (1990), is "the intensification of worldwide social relations which link distant localities in such way that local happenings are shaped by events occurring many miles away, and vice versa" (p. 64). This in consequence, influences societies, organizations and individuals. Jacques Delors (1996), the author of the assessment *Learning: The Treasure Within, the Report to UNESCO of the International Commission on Education for the Twenty-first* Century, emphasizes the essential task of contemporary educational policies, which "can help to create a better world, by contributing to sustainable human development, mutual understanding among peoples and a renewal of practical democracy" (p. 14). The principle to *leave no one behind* vividly applies to education as a tool for increasing cultural and diversity awareness and overcoming inequalities.

On the other hand, the global landscape is being transforming continuously; Veronica Boix Mansilla and Anthony Jackson (2013) define three factors that have significantly changed the socio-economic conditions we live in: the flattened global economy and changing demands of work; migration and immigration creating more culturally and linguistically diverse societies, and climate instability and the growing need for global environmental stewardship" (p. 2). In order to meet new expectations resulting from the process of transition, new sorts of capacities are necessary. The new requirement for thriving in contemporary culture is called *global competence* (Reimers, 2009; Boix Mansilla, and Jackson, 2013; Verger, 2014; Verger, and Curran, 2014; Murray, 2014).

The issue of global competence is not limited to the education discourse. The authors of the 6th World Bank's Report *Skills, not Just Diplomas* explain the context for necessity of developing new skills: "New skills have come into demand, as employment has been allocated away from declining industries and firms, towards expanding ones. In addition, there has been a large-scale shift of jobs from agriculture and, to a lesser extent, industry towards the service sector" (Sondergaard, Murthi, et al., 2012, p. 17). In turn, Cascio and Boudreau emphasize that the evolution of global business requires "the search for global competence – managerial, cultural, and operational. Global competence is embedded in organizational talent and the systems and leadership that organize and deploy it, but it is increasingly embedded within a workforce that lies beyond the familiar boundaries of regular full-time employment, and is empowered by technologies, platforms and connectedness (…)" (Cascio, and Boudreau, 2016, p. 103). The challenges of the modern labor market faced by employers and employees entail the development of competencies essential in today's ever-changing global environment. Kuzior and Sobotka (2019) noted that "along with the development of the economic reality described as Industry 4.0, questions about the role and function of Society 4.0 appear more and more often in the public debate" (p. 64). This discussion is evidently followed by considerations on present, as well as future labor competencies. Such circumstances determine the need for continuous education for employees and at the same time demand the appropriate education institutions response to prepare graduates for modern labor market requirements.

3. Global competence for global workers

Brookings has recently stated that according to experts' predictions, "by 2030, 825 million children in low- and middle-income countries – half of today's youths' generation – will reach adulthood without the skills they need to thrive in work and life" (Brookings.edu, 21.05.2018, para. 1). An important aspect within the framework of the question of education of the future is also to recognize the essence of shaping global competence for effective functioning in the global labor market. "Twenty-first century students live in an interconnected, diverse and rapidly changing world with the increasing role of intercultural encounters" (PISA, 2018, p. 4). Education meeting modern needs is a new challenge. Taking it into consideration, in 2015 17, Sustainable Development Goals (SDGs) were adopted by the General Assembly of the United Nations to be achieved until 2030; goal number four was education (PISA for Development Brief 2017/09, para. 1). Inclusive and quality education "enables upward socioeconomic mobility and is a key to escaping poverty. Education is also essential to achieving many other Sustainable Development Goals" (UN Sustainable Development Goals: 4 Quality Education, 2015, para. 2).

There is no doubt that comprehensive implementation of sustainable development objectives depends on systematic education and continuous broadening of the sphere of social awareness (Kuzior, 2006, p. 71). Education, as Jacques Delors (1996) acknowledges, is the key for both personal and community development; "its mission is to enable each of us, without exception, to develop our talents to the full and to realize our creative potential, including responsibility for our own lives and achievement of our personal aims" (p. 17).

One of the targets defined for Quality Education is described as "promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development" (UN Sustainable Development Goals: 4 Quality Education, 2015, para. 10). Whether this can be achieved depends to a large extent on teaching philosophy and curriculum in schools or higher education institutions. It is thus inevitable to foster contemporary concepts in education, such as *education for sustainable development*, *global education, global competence global citizenship, peace education* and *21st century skills* and to adopt them into education agenda and policies (Verger, 2014; Verger, and Curran, 2014; Murray, 2014).

Global education as an umbrella concept is understood as extending "the scope of civic education and upbringing to a global perspective, by making people aware of the phenomena and interdependencies that connect people and places. Its aim is to prepare recipients to face the challenges of all humanity. By interdependence, we understand the interconnectedness and diffusion of cultural, environmental, economic, social, political and technological systems. Global education puts a special emphasis on: explanation of the causes and consequences of the phenomena described; showing the individual's influence on global processes and the

impact of global processes on the individual; overcoming existing stereotypes and prejudices; presenting the global perspective of the South; shaping critical thinking and changing attitudes" (Lipska-Badoti et al, 2011, p. 4). Therefore, *global education* means an educational approach focused on developing understanding of other cultures and cultural interconnection. The idea of global competence derives from other concepts of global education mentioned above and is oriented on fostering understanding of the contemporary world and increasing the participation in society.

PISA – the OECD Program for International Student Assessment – explains that global competence is a multidimensional capacity that enables individuals "to examine local, global and intercultural issues, understand and appreciates different perspectives and world views, interact successfully and respectfully with others and take responsible action toward sustainability and collective well-being" (PISA, 2018, p. 4). According to Fernando M. Reimers, Director of the Global Education Innovation Initiative and the International Education Policy Master's Program at Harvard University, *global competence* is: "The knowledge and skills people need to understand today's flat world and to integrate across disciplines so that they can comprehend global events and create possibilities to address them. Global competencies are also the attitudinal and ethical dispositions that make it possible to interact peacefully, respectfully, and productively with fellow human beings from diverse geographies" (2009, p. 184). Polish pedagogist Urszula Dernowska (2013) underlines that *global competence* is "the ability to effectively interact with other people – people who speak different languages, who profess different religions, who believe in different values" (p. 22).

In other words, global competence incorporates attributes in the sphere of knowledge, skills and values, and enables one to act in international and intercultural environments, and to interact on the ground of mutual respect and openness to cultural diversity. Hence, as Veronica Boix Mansilla and Anthony Jackson (2013) claim, the globally competent student should acquire four competences indispensable to perform in globalized world: "Investigating the world beyond their immediate environment; framing significant problems and conducting well-crafted and age-appropriate research; recognizing the perspectives of others and their own; articulating and explaining such perspectives thoughtfully and respectfully; communicating ideas effectively with diverse audiences, bridging geographic, linguistic, ideological, and cultural barriers; taking action to improve conditions, viewing themselves as players in the world and participating reflectively" (p. 2).

Global competence as an educational concept is reflected in the forecasts of competences inevitable for modern organizations. The Institute of the Future (Davies, Fidler, and Gorbis, 2011) defines ten skills for future workforce: 1) Sense-making, 2) Social intelligence, 3) Adaptive thinking, 4) Cross-cultural competency; 5) Computational thinking and data-based reasoning, 6) New-media literacy and persuasiveness, 7) Trans-discipline understanding and integration, 8) Design mindset in external environments, 9) Cognitive load management, 10) Virtual collaboration. The need for global competence is a response for conditions

encountered in multinational and multicultural societies, and accompanies sociological, philosophical and legal reflection on multicultural reality in the era of globalization.

One of the most challenging issues for modern societies is multiculturalism, as the questions of ethnic, linguistic, religious or cultural diversity, the phenomenon of the coexistence of groups with different cultural backgrounds within a given territory and institutional solutions regulating their status and mutual relations are the subject of sociological, political, philosophical and legal reflection. Researchers undertake analysis of the phenomenon of multiculturalism both from an ethnic perspective – where ethnic bond is the foundation of identity, cultural content is passed from generation to generation, and cultural diversity is a consequence of migration, conflicts, wars, border changes – and from a non-ethnic perspective, which applies to social categories that differ in the field of normative systems, articulated interests or cultural practices (Mucha, 2005, p. 57). In the first approach, the subject of reflection will be multinational and multi-ethnic societies, immigrant societies; in the second, however, the processes of emancipation of social and cultural minorities are considered.

The idea of multiculturalism as an important and meaningful interdisciplinary category describing the dilemmas of the modern world is very capacious – hence, a multitude of interpretations and definitions of this concept can be found in literature. Marian Golka (2010) defines multiculturalism "as one of the incarnations of pluralism, a broader category covering all the plurality and diversity of social groups, layers and categories as well as their political, economic, social and cultural features functioning in society" (p. 65.). Therefore, according to the analysis of The Institute of the Future (Davies, Fidler, and Gorbis, 2011), "cross-cultural competency will become an important skill for all workers, not just those who have to operate in diverse geographical environments.

Organizations increasingly see diversity as a driver of innovation. Research now tells us that what makes a group truly intelligent and innovative is the combination of different ages, skills, disciplines, and working and thinking styles that members bring to the table" (p. 9). The role of education should not be forgotten while dealing with the new requirements concerning social networks, or discussion over global issues.

4. Global competence: employers' perception

One of the most important challenges for contemporary organizations, as Józef Ober underlines (2016) is "finding, hiring and keep the right employees with the right skills, experience and knowledge that are in line with what the company expects" (p. 353). Skills are usually divided into hard (job-specific, technical, technological) and soft (connected with emotional intelligence). The Cambridge Business English Dictionary defines soft skills *as people's abilities to communicate with each other and work well together*. The turn towards

soft skills has been already noticed both by researchers and practitioners – soft skills seem to have become the new hard skills". Recent research shows that "94% of recruiting professionals believe an employee with stronger soft skills has a better chance to being promoted to a leadership position than an employee with more years of experience but weaker soft skills (Forbes, 18.08.2017, para. 1). Communication, teamwork, adaptability, empathy, work ethic, problem solving and collaboration – these are attributes inevitable to become successful in work life. Strong communication skills and willingness to learn new things are valued by employers (Edsurge.com, 12.06.2019, para. 1-5). What is significant – the list of 21st century skills is composed mainly of soft skills: 1) critical thinking; 2) creativity; 3) collaboration; 4) communication; 5) information literacy; 6) media literacy; 7) technology literacy; 8) flexibility; 9) leadership; 10) initiative; 11) productivity; 12) social skills (Applied Educational Systems, access date 27.07.2019). What is, therefore, the difference between soft skills and global competence? Competence – as OECD Program for International Students Assessment explains (2018), is much more than skill, since it is "a combination of knowledge, skills, attitudes and values successfully applied to face-to-face, virtual or mediated encounters with people perceived to be from a different cultural background (PISA, 2018, p. 7). The quoted document also emphasizes that acquiring global competence is a life-long process.

According to PISA, global competence consists of four dimensions that shape globally competent people who: 1) examine issues of local, global and cultural significance; 2) understand and appreciate the perspective of others; 3) engage in open, appropriate and effective interactions across cultures; 4) Take action for collective well-being and sustainable development (PISA, 2018, pp. 7-11). The first dimension of global competence refers to purposeful using knowledge and critical thinking when it comes to making judgments on global and intercultural issues. It requires skills such as selecting and weighing arguments, thus media literacy and effective use of media. The second dimension indicates willingness and capacity to understand global issues from different perspectives, regarding that they result from a system of reference that construct, objectified social reality (Berger, and Luckmann, 1991). This means that globally competent individuals consider that values and behavior of others are influenced by different concepts of reality.

The third component of global competence stresses the ability to interact appropriately with people from different background; i.e. not only understanding the others, but also having the capacity to be responsive and prepared for a dialogue. "Diversity will, therefore, become a core competency for organizations over the next decade. Successful employees within these diverse teams need to be able to identify and communicate points of connection (shared goals, priorities, values) that transcend their differences and enable them to build relationships and to work together effectively" (Davies, Fidler, and Gorbis, 2011, p. 9).

Last, but not least, a further trait, being active and self-conscious members of society, is fundamental to survival in the Fourth Age. Such individuals are those able to mobilize resources in order to respond to local, global and intercultural issues. These attributes are described and implemented through four equivalent measures (PISA, 2018, pp. 12-18):

1) knowledge – knowledge about global issues, intercultural knowledge, knowledge about environmental issues, socio-economic development and interdependence;

2) skills – cognitive, communication and socio-emotional complex patterns of thinking or behavior inevitable to achieve a goal;

3) attitudes – mind-set of beliefs or feelings toward a person, a group, an institution, an issue, a behavior, a symbol;

4) values – standards used consciously and unconsciously as a reference for judgments.

It is difficult to question the necessity of establishing global competence around the world, considering the global issues and globalization processes we all are subjected to, no matter where we live. The authors of *The Global Skills Gap Report in the 21st Century* (2018) confirm the commonly known fact, "that universities do not necessarily provide enough opportunities for students to develop skills critical for the labor market" (p. 5) and lay bare that the most important skills across the globe are considered to be problem-solving, the ability to work in a team, and being communicative (p. 8). In the case of business education, Kedia B.L. and Englis P.D. (2011) identifies "a disconnect between global economic realities and the ability of business schools to produce global managers. The gap between traditional business education programs and the business skills set that students need to deal effectively with the global marketplace was noted over two decades ago" (p. 325-326). Still, many of these skills can be developed through existing subjects or special courses taking advantage of processes of internationalization of institutions of higher education, as well as internationalization at home policies.

5. Conclusion

The concept of global competence is inevitable while challenging the issues of sustainable development, global organizations and global workers. There is a need for establishing global competence as a multidimensional capacity recognizing the socio-economic requirements of today's labor reality, including the increasing role of migration and intercultural issues, culturally diverse teams and intercultural encounters. The notion of global competence is connected with the changing environment of the global labor market and of requirements that contemporary employees should perform. This concept is strongly present in contemporary literature, and is particularly evident in studies on the role of education in the globalized world.

Moreover, it is noticeable in countries that have recently undergone socio-economic transformation and have become an attractive destination for labor migration – such as Poland.

References

1. *Applied Education Systems*, available online: https://www.aeseducation.com/career-readiness/what-are-21st-century-skills, 27.07.2019.
2. Bauman, Z. (2010). *44 letters from the Liquid Modern World*. Cambridge: Polity Press.
3. Berger, P.L., and Luckmann, T. (1991). *The Social Construction of Reality. A Treatise in the Sociology of Knowledge*. Penguin Books.
4. Boix Mansilla, V., and Jackson, A. (2013). Educating for Global Competence: Learning Redefined for an Interconnected World In Heidi Jacobs. *Mastering Global Literacy, Contemporary Perspectives*. New York: Solution Tree.
5. *Brookings.edu*, Citizens of the future: Innovations to leapfrog global education. Accessible online: https://www.brookings.edu/events/citizens-of-the-future/, 27.07.2019.
6. Cascio, W.F. and Boudreau, J.W. (2016). The search for global competence: From international HR to talent management. *Journal of World Business, 51,* 103-114.
7. Davies, A., Fidler, D., Gorbis, M. (2011). *Future Work Skills 2020. Palo Alto, CA: Institute for the Future*. Accessible online: http://www.iftf.org/uploads/media/SR-1382A_UPRI_future_work_skills_sm.pdf, 28.07.2019.
8. Delors, J. (1996). *Learning: The Treasure Within, the Report to UNESCO of the International Commission on Education for the Twenty-first Century*. UNESCO Publishing. Retrieved from UNESDOC Digital Library: https://unesdoc.unesco.org/ark:/48223/pf0000109590, 26.07.2019.
9. Dernowska, U. (2013). Kompetencja globalna w szkole. *Przegląd Pedagogiczny, 2*, 17-32.
10. Giddens, A. (1990). *The Consequences of Modernity*. Stanford: Stanford University Press.
11. Golka, M. (2010). *Imiona wielokulturowości*. Warszawa: Warszawskie Wydawnictwo Literackie „Muza SA".
12. Kedia, B.L. and Englis, P.D. (2011). Transforming business education to produce global managers. *Business Horizons, 54*, 325-331.
13. Kuzior, A. (2006). Człowiek jako racjonalny podmiot działań w świetle założeń koncepcji zrównoważonego rozwoju. *Problemy Ekorozwoju, 1, 2*, 67-72.
14. Kuzior, A. and Sobotka B. (2019). Key competencies in the modern business services sector. *Organization and Management Scientific Quarterly, 2(46),* 63-74, doi: 10.29119/1899-6116.2019.46.5.

15. Lipska-Badoti, G., Rostek, B., Szczygieł, P., and Witkowski, J. (2011). *Edukacja globalna w szkole. Każdy nawija*. M. Metera, K. Wojda (eds.), Warszawa: Centrum Edukacji Obywatelskiej, Polska Akcja Humanitarna.

16. Mucha, J. (2005). *Oblicza etniczności. Studia teoretyczne i empiryczne*. Kraków: Zakład Wydawniczy Nomos.

17. Ober, J. (2016). Employer branding – strategia sukcesu organizacji w nowoczesnej gospodarce. *Zeszyty Naukowe Politechniki Śląskiej Seria: Organizacja i Zarządzanie, 95*, 345-356.

18. *OECD,* PISA 2018 Global competence. Accessible online: http://www.oecd.org/pisa/pisa-2018-global-competence.htm, 27.07.2019.

19. *OECD,* PISA for Development Brief 2017/09. Accessible online: https://www.oecd.org/pisa/pisa-for-development/17-PISA-D-and-SDG4.pdf, 27.07.2019.

20. QS Intelligence UNIT, *The Global Skills Gap Report in the 21st Century,* Retrieved from: https://www.qs.com/the-global-graduate-skills-gaps/, 15.07.2019.

21. Reimers, F.M. (2009). Educating for Global Competency. In J. Cohen, M. Malin (Eds.), *International Perspectives on the Goals of Universal Basic and Secondary School* (pp. 183-202). Routledge Press.

22. Sondergaard, L., Murthi, M. et al. (2012). *Skills, Not Just Diplomas. Managing Education 9 for Results in Eastern Europe and Central Asia*. Washington: The World Bank.

23. Tate, E. (2019). *Edsurge.com.* Students in Tech Say Soft Skills and Arts Set Them Up for Success. Accessible online: https://www.edsurge.com/news/2019-06-12-students-in-tech-say-soft-skills-and-the-arts-set-them-up-for-success, 27.07.2019.

24. *United Nations Sustainable Development Goals*, *Education*. Accessible online: https://www.un.org/sustainabledevelopment/education/, 27.07.2019.

25. *United Nations Sustainable Development Goals*, Quality Education – why it matters? Retrieved from: https://www.un.org/sustainabledevelopment/wp-content/uploads/2017/02/4.pdf, 27.07.2019.

26. Verger, A. (2014). Why do policy-makers adopt global education policies? Toward a research framework on the varying role of ideas in education reform. *Current Issues in Comparative Education, 16, 2,* 14-29.

27. Verger, A., and Curran, M. (2014). New Public Management as Global Education Policy: Its Adoption and ReContextualisation in a Southern European Setting. *Critical Studies in Education*, doi: 10.1080/17508487.2014.913531.

PERSONNEL SELECTION METHODS AND THE EMPLOYEE'S LABOUR MARKET

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Abstract: The aim of the study was to present a comparative analysis of personnel selection methods with the participation of two key groups in the recruitment process: recruiters and candidates. A multidimensional assessment was performed of the following selection tools: interview, application forms, personal questionnaires, psychological testing, knowledge tests, work samples, Assessment Centre (AC) and candidate screening. The study included 193 people aged between 20 and 55 years. Of these, 84 were HR professionals, and 109 were candidates for positions. The subjects assessed the personnel selection methods using a proprietary tool based on semantic differential. The obtained results indicate that the candidates and recruiters differed in their assessment of the methods. The recruiters considered the AC, personal questionnaire, psychological tests and knowledge tests as the most effective, followed by work samples and candidate screening, with the application forms and interview as the least effective. In contrast, the candidates rated the interview the most highly, followed by application forms, candidate screening, work samples, psychological tests and knowledge tests, with personal questionnaires and AC the lowest. Summarising, research and practice in the field of HR needs to take into considerations macro issues (examining HR system more broadly), as well as micro issues (examining individual differences and perception).

Keywords: recruitment and selection, personnel selection methods, recruiters, candidates, employee's labour market.

1. Introduction

The past 10 years has seen a dramatic increase in the demand for workers in response to continual growth in the global economy (Barometer of employment prospects, 2018). Moreover, prognoses suggest that this demand may grow, with a very high requirement for employees. Of the labour markets in the EMEA area, the Polish market is regarded as being the fifth easiest regarding employment (Barometer of employment prospects, 2019). Hence, it would be fair to state that the current labour market is one for employees, as it is the job

seekers who decide which advert to respond to and in which job to remain. Therefore, firms have taken steps to encourage applications from unemployed candidates and workers at other firms by investing in more refined recruitment strategies and in "recruiting with class". The latter means a focus on the customer, a two-way flow of information and the regular assessment of personnel selection methods from the macro HR perspective and the micro candidate's perspective. All these activities are designed to create an attractive image of an employer.

As it is shown form the meta-analysis by Chapman et al. (2005), the attractiveness of an employer correlates with the perception of the job (i.e. bonuses, type of work), of the organisation (i.e. its brand, reputation, location) and of the recruitment and selection process (i.e. recruiter's behaviour, choice of HR methods).

With this in mind, the aim of the present study was to introduce a comparative analysis of personnel selection methods with the participation of two key groups: recruiters and candidates. Firstly, the obtained knowledge fits with the idea of supporting business practice through science; secondly, it gains a greater understanding of the expectations of the two parties, which can lead to the better design of recruitment programmes and identification of the most effective methods of personnel selection.

2. Methods of personnel selection and the employee's labour market

The review will begin by defining the concept of personnel selection. Witkowski (2007) regards selection as essentially being of a social and bidirectional nature: on the one hand, an organisation makes a decision to submit a job offer to a candidate, while on the other, the candidate decides whether to accept it. In the institutional context, personnel selection is defined as a set of actions taken to fill a position so as to guarantee the continuity and efficiency of the organisation (Marek, 2008). During this process, it is important to adjust the competences of the candidate to the requirements of the workplace. To achieve this, a specific method of personnel selection is needed, i.e. one that enables the organisation to verify the professional suitability of its potential employees (Cowling, 2000; Kawka, & Listwan, 2004). Accordingly, the method of personnel selection is understood as any form of activity that allows the selection of the best candidate for performing the tasks associated with a given position (Suchar, 2008).

Declining unemployment, difficulties in finding candidates and dynamic changes in competence requirements represent a real challenge for all business owners, bearing in mind that retention is now an everyday occurrence. McKinsey reports that while a typical period of employment in one organisation in the 1950s was longer than 23 years, this is now around 4 years. In addition, the costs of recruitment and induction are continually rising. For this reason, the labour market requires that not only do candidates need to be identified and

contacted, but their professional competences also need to be verified using personnel selection methods. In addition, potential candidates may sometimes be discouraged from applying for a position due to the fear of the recruitment procedure; however, it is possible to increase the chances of their participation by including them in the recruitment and selection process. Another advantage of this approach is that such activities may also serve to build a positive image and brand for the employer (Backhaus, and Tikoo, 2004).

Backhaus and Tikoo (2004) propose that building such an image and brand confers a competitive advantage by emphasising the attractiveness of the organisation and the productivity of its employees. In this model, the actions undertaken as part of such employer branding are used to shape two assets: 1) the attractiveness of the organisation to external stakeholders and 2) loyalty to the employer's brand, resulting from the identity and culture of the organisation and the productivity of its employees (internal stakeholders). It should be assumed that the relations in question are bilateral, i.e. strengthening the employer brand increases the attractiveness and efficiency of the job, and conversely, these individual components can also support brand building. Hence, the methods chosen for personnel selection, i.e. striving for excellence in the process of acquiring staff, can be a source of benefits for current and potential employees and contribute to creating a strong employer brand.

Following previous studies regarding the frequency of use of selection tools (Dale, 2013; Jarecki, 2012; Marek, 2008; Witkowski, 2007; Wood, & Payne, 2006), the following methods of staff selection were chosen for evaluation in the present study: 1) interview, 2) application form, 3) personal questionnaire, 4) psychological tests, 5) knowledge tests, 6) practical tests (work samples), 7) Assessment Centre (AC) and 8) candidate screening. Due to the fact that the selection of appropriate tools may determine the success of recruitment and even support the reputation of the employer, a number of studies have endeavoured to identify which method is regarded as the most effective.

3. The aim of the study

In the light of these issues, the theme of the study was to present a comparative analysis of the perceived effectiveness of chosen methods of personnel selection with the participation of both recruiters and potential employees. Although literature is rich in works evaluating selection tools with various criteria and groups of assessors, most studies examine the predictive validity of the methods (Armstrong, 2007; Cowling, 2000; Sajkiewicz, 1999; Witkowski, 2007) or the frequency of their application (Furnham, 2008; Lichtarski, 2007; Witkowski, 2007).

A meta-analysis of studies by Hunter and Schmidt on the methods of personnel recruitment (1990 by Lipińska-Grobelny, 2010) found that practical tests and special ability tests, Assessment Centre, cognitive tests (general intelligence) and a biographical questionnaire were

generally regarded as being the most accurate forms of testing. In contrast, interview and personality testing appear to be characterised by a moderate degree of reliability and accuracy by many professional fields, while references and graphology are believed to provide the least reliable information about the candidate. Some interesting conclusions were reached in a survey of 255 specialists in personnel departments (52% women and 48% men), mainly employees of large British companies, regarding methods of assessing job candidates. The results indicate that the recruiters regarded the Assessment Centre (14.9%), cognitive tests (13.9%) and work samples (13.6%) as the most accurate methods of personnel selection, while recommendations (10.8%), references (9.6%) and biographical questionnaire (7.8%) were rated lowest (Furnham, 2008). A study of workers dealing with candidate selection also found the most common, and often the only, selection method to be the traditionally-conducted interview, being indicated in 66% of cases; less popular were the knowledge and skills tests (25%), Assessment Centre (19%), application analysis (16%), with case study (2%) and personal questionnaire (1%) being the least commonly used (Chirkowska-Smolak & Grobelny, 2014).

However, while Chirkowska-Smolak et al. (2014) or Furnham (2008) only evaluated recruiters, the present study surveys two groups involved in the selection process: recruiters and candidates. Additionally, in order to operationalise the concept of effectiveness, the current research examines the respondents concerning features which the most effective selection tools should possess, rather than using only single evaluation criteria (a frequency or the overall assessment of effectiveness). In this scrutiny, seven adjectives were selected, these being helpful, fair, multifaceted, effective, valid (in the sense of returning results that can be acted upon), reliable and non-schematic. They will be described more fully below. These adjectives were then used as sub-dimensions of effectiveness in the preparation of an original tool based on the semantic differential. It should be emphasised that this multidimensional approach was intended as a contrast to the single-dimension approach used in previous studies. Thus, the first research question was formulated:

Q1. Is there a difference between recruiters and candidates with regard to their assessment of personnel selection methods, with reference to the following dimensions: 1.1. helpful in making personnel decisions; 1.2. fair; 1.3. multifaceted; 1.4. effective; 1.5. valid; 1.6. reliable; 1.7. non-schematic?

The second research question was proposed in response to the possibility of comparison with other single-dimension surveys.

Q2. Is there a difference between recruiters and candidates in their assessment of the overall effectiveness of particular personnel selection methods?

4. Materials and Methods

4.1. Study group

The study included 193 respondents aged 20 to 55 (*M = 28, SD = 7.17*), including 84 recruiters (R) and 109 candidates (C). The analyses were carried out in accordance with the principles given in the Helsinki Declaration. The respondents were informed that their participation was voluntary, they were fully informed about the purpose and course of the study, and they were assured of their anonymity and the fact that the results would only be used for group analyses. The group of recruiters included 84 respondents (49 women and 35 men) aged 21 to 54 years (*M = 30.2, SD = 6.5*), whose seniority in the position did not exceed ten years. Of this group, 94% were employees of personnel departments, while the remaining 6% were individuals influencing the personnel policy of a firm, i.e. company owners, directors or board members. In this group, all respondents had completed higher education, with the most frequently declared fields of study being Psychology (43%), Human Resources Management and Pedagogy (30%). The second group comprised 109 candidates seeking employment (70 women and 39 men) aged 20 to 55 years (*M = 30.1, SD = 7.6*), of whom 45% had participated in at least five recruitment processes. Of this group, 65% had completed higher education, and 32% only secondary education.

4.2. Employed study tools

To address the study questions, a proprietary tool based on Osgood's semantic differential technique was used to quantitatively assess the content. The judgment-making procedure consists of placing the subject of the study, i.e. a specific selection method, on an empirical continuum determined by a pair of opposing adjectives (e.g. effective-ineffective). These individual continua form sub-dimensions that define the semantic space, within which the meaning of the tested concept is located. In addition, the scales used in the tool are strongly correlated with each other, thus forming a correlation bundle, i.e. a single dimension, which can be used to indicate overall assessment of effectiveness (Osgood, Suci, and Tannenbaum, 1957). The semantic differential prepared for the needs of the study was based on a five-point scale of responses for each of the seven sub-dimensions of the effectiveness of personnel selection methods given earlier. These were:

- helpful vs. unhelpful in making a decision about employment – the method largely supports the selection of the candidate and allows the assessor to fully present the desired competences;
- fair vs. unfair – the method allows reliable assessments to be made and minimises unfairness in the process of making personnel decisions;

- multifaceted vs. single-aspect – the method allows a wide range of candidate potential to be checked;
- effective vs. ineffective – the method allows the selection of a candidate whose competences are best suited to the needs of the job;
- valid vs. invalid – the use of a specific method allows for objective measurement of the competences under test and gives measurable results;
- reliable vs. unreliable – the method is a good way of measuring what it has been intended for and guarantees measurement repeatability when re-used;
- non-schematic vs. schematic – the recruiter does not need to adhere to a specific procedure for testing with the given method.

The reliability of the tool was evaluated separately in the recruiter and candidate groups using Cronbach's alpha internal consistency method. The coefficients are presented in Tables 1-2. The obtained results indicate that the semantic differential for each of the eight methods of personnel selection in the candidate group was highly coherent, ranging from 0.94 to 0.99. The results in the recruiter group were satisfactory, although more varied (0.56-0.86). Overall, across the whole group of 193 respondents, Cronbach's alpha found a satisfactory internal consistency (from 0.9 to 0.99).

Table 1.
Cronbach's alpha coefficients for the semantic differential for each studied personnel selection method (recruiters, N = 84)

	Interview	Application form	Personal questionnaire	Psychological tests	Knowledge tests	Work samples	Assessment Centre	Candidate screening
Cronbach's alpha	0.64	0.74	0.56	0.78	0.71	0.79	0.86	0.86

Table 2.
Cronbach's alpha coefficients for the semantic differential for each studied personnel selection method (candidates, N = 109)

	Interview	Application form	Personal questionnaire	Psychological tests	Knowledge tests	Work samples	Assessment Centre	Candidate screening
Cronbach's alpha	0.94	0.95	0.97	0.97	0.97	0.98	0.99	0.98

5. Results

The tables present the results of the non-parametric Mann-Whitney U-test for independent samples and the size of the obtained effect as a rank-biserial correlation coefficient according to Glass (r_g). The first part of this section addresses the first research question, i.e. do recruiters and candidates vary in their assessment of the chosen personnel selection methods, with respect to the following dimensions: helpful (in making personnel decisions), fair, multifaceted, effective, valid, reliable and non-schematic.

The data contained in Table 3 and 4 reveals that the interview and application forms differed significantly for all tested sub-dimensions (U_1 to U_6) apart from non-schematic (U_7), with the recruiters awarding higher mean rank scores for the other six sub-dimensions. For the interview, small effects ($r_g = 0.1$) were observed for validity, effective, reliable, fairness and helpful. Only multifaceted achieved a moderate effect ($r_g = 0.36$). Similarly, the application forms were found to have a weak effect for most sub-dimensions (effective, valid, reliable, fair, non-schematic). None of the effects were found to have high values. Multifaceted and helpful were characterised by moderate results.

Table 3.
Comparative analysis of the seven sub-dimensions for the interview, application forms, personal questionnaire and psychological tests

	Interview		Application form		Personal questionnaire		Psychological tests	
	Mann-Whitney U-test	*r_g*	*Mann-Whitney U-test*	*r_g*	*Mann-Whitney U-test*	*r_g*	*Mann-Whitney U-test*	*r_g*
Helpful (1)	**3,480.5****	0.23	**2,955.5*****	0.35	**2,309*****	0.5	**2,592.5*****	0.43
Fair (2)	**3,585****	0.21	**3,356.5*****	0.26	**2,530.5*****	0.45	**2,630.5*****	0.43
Multifaceted (3)	**2,,926.5*****	0.36	**3,202.5*****	0.30	**2,593*****	0.43	**2,531.5*****	0.45
Effective (4)	**3822****	0.16	**3,618****	0.21	**2,273.5*****	0.5	**2,471.5*****	0.46
Valid (5)	**3,863.5****	0.15	**3,563.5****	0.22	**2,357.5*****	0.48	**2,266*****	0.5
Reliable (6)	**3,771.5****	0.17	**3,475.5****	0.24	**2,119.5*****	0.54	**2,501*****	0.45
Non-schematic (7)	4,568	0	4,341	0.05	**2,948*****	0.36	**2,559.5*****	0.44

Note: $p < 0.05$*; $p < 0.01$**; $p < 0.001$***

r_g - 0.1 - small effect; r_g - 0.3 - moderate effect; r_g - 0.5 - large effect

Table 4.
Mean rank score for the seven sub-dimensions for the interview, application form, personal questionnaire and psychological tests

	Interview		Application form		Personal questionnaire		Psychological tests	
	Recruiter	Candidate	Recruiter	Candidate	Recruiter	Candidate	Recruiter	Candidate
Helpful (1)	**110.07**	86.93	**116.32**	82.11	**124.01**	76.18	**120.64**	78.78
Fair (2)	**108.82**	87.89	**111.54**	85.79	**121.38**	78.22	**120.18**	79.13
Multifaceted (3)	**116.66**	81.85	**113.38**	84.38	**120.63**	78.79	**121.36**	78.22
Effective (4)	**106.0**	90.06	**108.43**	88.19	**124.43**	75.86	**122.08**	77.67
Valid (5)	**105.51**	90.44	**109.08**	87.69	**123.43**	76.63	**124.52**	75.79
Reliable (6)	**106.60**	89.60	**110.13**	86.89	**126.27**	74.44	**121.73**	77.94
Non-schematic (7)	96.88	97.09	99.82	94.83	**116.40**	82.05	**121.03**	78.48

The Mann-Whitney *U*-test revealed significant differences between recruiters and candidates regarding the seven dimensions of the personal questionnaire and those of the psychological tests (Tables 3-4). Again, the recruiters tended to assign higher grades to the individual sub-dimensions for the personal questionnaire and psychological tests than the candidates. The effect sizes of the dimensions for the personal questionnaire were: moderate ($r_g = 0.3$) for non-schematic, multifaceted, fair, valid; or high ($r_g = 0.5$) for helpful, effective, reliable. Those of the psychological tests were similar, with moderate values observed for

helpful, fair, non-schematic, reliable, multifaceted and effective. The only high effect was observed for valid.

When analysing the results given in Table 5 and 6, it is important to note that significantly different scores were awarded by recruiters and candidates for all tested sub-dimensions of knowledge tests and practical exercises (work samples). Significantly higher results were obtained from the group of recruiters. In most cases, the size of the effect was moderate ($r_g = 0.3$): non-schematic, valid, effective, multifaceted, reliable and fair for the knowledge tests; and fair, valid, multifaceted and effective for the practical exercises. A large effect ($r_g = 0.5$) was observed for helpful for knowledge tests and practical exercises, as well as for reliable for practical exercises.

Table 5.
Comparison of knowledge tests, practical exercises (work samples), Assessment Centre and candidate screening in terms of the seven sub-dimensions

	Knowledge tests		Work samples		Assessment Centre		Candidate screening	
	Mann-Whitney U-test	*r_g*	*Mann-Whitney U-test*	*r_g*	*Mann-Whitney U-test*	*r_g*	*Mann-Whitney U-test*	*r_g*
Helpful (1)	2,145***	0.5	2,027***	0.56	1,617***	0.65	2,826***	0.38
Fair (2)	2,331***	0.49	2,651.5***	0.42	2,011***	0.56	3,775**	0.17
Multifaceted (3)	2,490***	0.46	2,397.5***	0.48	1,844.5***	0.6	3,263.5***	0.29
Effective (4)	2,527.5***	0.45	2,342***	0.49	1,877***	0.59	3,128.5***	0.32
Valid (5)	2,926.5***	0.36	2,608.5***	0.43	2,118.5***	0.54	3,605**	0.21
Reliable (6)	2,402***	0.47	1,905***	0.58	1,827.5***	0.6	2,926***	0.36
Non-schematic (7)	2,987***	0.35	3,733*	0.18	1,993.5***	0.56	3,006.5***	0.34

Note: $p < 0.05$*; $p < 0.01$**; $p < 0.001$***
r_g - 0.1 - small effect; r_g - 0.3 - moderate effect; r_g – 0.5 - large effect

Table 6.
Mean rank values for knowledge tests, practical exercises (work samples), Assessment Centre and candidate screening in terms of the seven tested sub-dimensions

	Knowledge tests		Work samples		Assessment Centre		Candidate screening	
	Recruiter	Candidate	Recruiter	Candidate	Recruiter	Candidate	Recruiter	Candidate
Helpful (1)	125.96	74.68	127.37	73.60	132.25	69.83	117.86	80.93
Fair (2)	123.75	76.39	119.93	79.33	127.56	73.45	106.56	89.63
Multifaceted (3)	121.86	77.84	122.96	77.00	129.54	71.92	112.65	84.94
Effective (4)	121.41	78.19	123.62	76.49	129.15	72.22	114.26	83.70
Valid (5)	116.66	81.85	120.45	78.93	126.28	74.44	108.58	89.07
Reliable (6)	122.90	77.04	128.82	72.48	129.74	71.77	116.67	81.84
Non-schematic (7)	115.94	82.40	107.06	89.25	127.77	73.29	115.71	82.58

Finally, significant differences were observed between the two tested groups with regard to their evaluation of the final two assessment tools, i.e. the Assessment Centre and candidate screening. As with the previous tools, these two were rated more highly by the group of recruiters. The effect size for the Assessment Centre was large ($r_g = 0.5$) for all tested sub-dimensions, i.e. helpful, fair, multifaceted, effective, valid, reliable and non-schematic. Regarding the candidate screening, effective, non-schematic, reliable and helpful demonstrated

moderate effect sizes ($r_g = 0.3$), while fair, valid and multifaceted were small ($r_g = 0.1$) (Tables 5-6).

The second study question compared the evaluation of recruiters and candidates with regard to their overall assessment of the effectiveness of the selection tool, this being the resultant of the seven dimensions of the semantic differential. As can be seen in Table 7, the two groups gave different evaluations for interview, application form, personal questionnaire, and for psychological testing, knowledge test, work samples, Assessment Centre and candidate screening. Small effect sizes were observed for interview, application form and candidate screening, with a moderate effect for practical exercises (work samples), knowledge test and psychological testing. Two tools demonstrated large effect sizes: personal questionnaire and Assessment Centre.

Recruiters considered the Assessment Centre to be the most effective method, followed by the personal questionnaire, psychological testing and knowledge tests, then followed by practical exercises (work samples), candidate screening and, finally, application forms and interview. In contrast, the candidates rated the interview the highest, followed by the application documents, candidate screening, practical exercises (work samples), psychological testing and knowledge tests, with the personal questionnaire and AC being rated the lowest.

Table 7.
Comparison of all personnel selection tools with regard to their overall effectiveness

	Mann- Whitney U-test	r_g	M_R	M_C
Interview	**3,708.5***	0.19	**107.35**	89.02
Application form	**3,497.5***	0.24	**109.86**	87.09
Personal questionnaire	**2,296.0*****	0.5	**124.17**	76.06
Psychological tests	**2,411.5*****	0.47	**122.79**	77.12
Knowledge tests	**2,468.5*****	0.46	**122.11**	77.65
Work samples	**2,677.5*****	0.42	**119.63**	79.56
Assessment Centre	**2,073.5*****	0.55	**126.82**	74.02
Candidate screening	**3,343.5*****	0.27	**111.70**	85.67

Note: $p < 0.05$*; $p < 0.01$**; $p < 0.001$***
r_g - 0.1 - small effect; r_g - 0.3 - moderate effect; r_g – 0.5 - large effect

6. Discussion

The objective of this research was to perform a comparative analysis of chosen personnel selection with the participation of two key groups: recruiters and candidates. The obtained knowledge fits with the idea of supporting business practice through science. Moreover, it gains a greater understanding of the expectations of the two parties, which can lead to the better design of recruitment programmes and identification of the most effective methods of personnel selection. In these times characterised by a job seekers' labour market, candidates expect not only access to job offers, but also a personalised approach to the recruitment process. Growing

numbers of organisations are becoming aware of the importance of getting to know the experiences and impressions held by candidates, together with their evaluation of the recruitment process. Not only does this have an influence on the management of human resources in the organisation, but also on the public image of the company and its business effects. Negative impressions from the recruitment process can quickly be shared, thus tarnishing the image of the company and, more importantly, reducing interest among potential candidates.

The first research question (Q1.1.-Q1.7.), regarding whether the two groups of respondents differed in their assessment of individual methods of personnel selection, was confirmed. The recruiter group, i.e. the staff of the HR department and those responsible for steering the company HR policy, rated the interview, application forms, personal questionnaire, psychological testing, knowledge tests, work samples, Assessment Centre and candidate screening more highly than the candidates with regard to helpfulness in making personnel decisions, fairness, their multi-faceted nature, effectiveness, validity, reliability and non-schematic structure (with the exception of the interview and application forms). The magnitude of the effect ranged from medium to high. This more favourable evaluation by the recruiters may result from their more extensive knowledge about the effectiveness of the various selection tools and their wider experience of their use. In addition, their commitment may also have played a role, and this may adversely affect the selection of personnel selection methods.

An analysis of the seven individual sub-dimensions indicates that specialists considered the Assessment Centre to be the most helpful method in deciding upon staff, as well as being the fairest, most multifaceted, effective, valid, reliable and non-schematic tool. The recruiters also rated practical exercises and knowledge tests quite highly in terms of helpfulness, while the candidates preferred interview, application forms and candidate screening. In terms of fairness, the recruiters rated the Assessment Centre, knowledge tests and personal questionnaires the most highly, while the candidates preferred the candidate screening, interview and application forms as not only fair, but also superior in terms of being multi-faceted, effective, valid, reliable and non-schematic. The multidimensional analysis revealed that the recruiters ranked the Assessment Centre as being the most effective tool overall; however, practical exercises and interview were also awarded high scores for being multifaceted, personal questionnaire and practical exercises as being effective, psychological tests and personal questionnaire for validity, practical exercises and personal questionnaire for reliability, and psychological testing and knowledge tests were rated highly for being non-schematic.

Regarding the second question, the recruiters gave a more favourable assessment of overall effectiveness for some of the personnel selection tools. Interestingly, while the Assessment Centre (AC) was ranked most highly by recruiters, it was rated lowest by the candidates. The recruiters based their positive evaluation on its multidimensionality and its level of precision associated with its preparation and implementation. In addition, as the successful candidate can be equipped with the necessary hard skills for a post relatively quickly, employers

tend to place more value on assessing soft skills during recruitment and thus place a high value on Assessment Centre evaluation during recruitment as a method of verifying behaviour in the workplace. Further confirmation of these high scores can be found in meta-analyses by J.E. Hunter and F.L. Schmidt (1990) (Lipińska-Grobelny, 2010) and A. Furnham (2008), which confirm the significance of the Assessment Centre. In turn, the candidates reacted negatively to the AC, due to the sophisticated method of research, lack of introductory information as to its purpose and the nature of the tasks being performed. In addition, the personal questionnaire and psychological testing were ranked much more highly by the recruiters than the candidates, and while the candidates regarded the interview, application form and candidate screening as the most effective tools, the recruitment group found the opposite. It is possible that the candidates have the highest regard for the methods with which they have the most contact; therefore, the perception of the AC among candidates and the procedures associated with it may be improved by regularly referring to the AC during recruitment.

The results obtained are quite surprising, as the specialists implementing the process of personnel selection have an entirely different perception of the selection tools as its main heroes, i.e. the candidates. The evaluations given by the recruiters are not surprising when considering their greater experience, knowledge and qualifications regarding the issue. They regard the most effective methods as those that are standardised with a clearly defined procedure and which offer clear recommendations for choosing the best candidate. However, it seems that specialists do not appreciate which methods are the most popular or which are used most frequently (Dale, 2013; Jarecki, 2012; Marek, 2008; Witkowski, 2007). In addition, our findings suggest they also do not favour the methods preferred by the candidates. The high scores awarded by candidates to traditional interviews and application forms may be associated with the high popularity and wide availability of these methods. The candidates may have knowledge regarding the theoretical and practical aspects of the methods which were used to test them. There could also be a contextual effect associated with the tools, where positive associations are activated by the experience, e.g. getting a job after a job interview. In addition, their positive evaluation of these methods may offer an insight into the nature of the labour market and may encourage candidates to take part in the recruitment and selection process. These methods are also the most commonly used by recruiters during the selection process (Chirkowska-Smolak & Grobelny, 2014). Well-known methods, such as interviews or application forms, provide a sense of security for the candidates, and they guarantee preparedness and eliminate stress.

The role of the specialist is to create a personnel selection process to attract as many potential employees as possible and then to select those whose competences are best suited to the vacant position. As a well-chosen method can widen the pool of people taking part in the recruitment process, our present findings, and the dynamics of the labour market, emphasise the need to consider the opinion of the candidates regarding recruitment. However, while interviews and application forms have proven to be effective tools from the point of view of the

candidate, recruiters should also further refine their use to suit their own needs. Well-structured interviews can achieve high efficiency, but the results depend on the content and form of the interview. The best solution for the two groups may lie within the structure of the tool, i.e. by choosing suitable questions for the interview and devising appropriate criteria for assessing the response. Topgrading, by Brad Smart, details an ideally prepared job interview, including behavioural, cognitive or situational questions with clearly defined assessment criteria, irrespective of the subjectivity of the recruiter.

7. Summary, limitations and directions for future study

Due to the pace of change in the modern world, we now live and work in a global village. One space for the exchange of experiences and competences is the labour market, which extended its borders outside Poland in 2004 upon its accession to the European Union. This event opened doors, not only for Polish specialists planning to work overseas, but also to corporations who had hitherto only been successful in Poland. The Polish economic landscape has undergone considerable changes in recent years, and these changes are particularly visible in the sphere of employment. Unemployment fell from 11.4% at the end of 2014 to 5.8% at the end of 2018. Many businesses, both Polish and foreign, which had not previously had problems with recruitment, now face the challenge of providing full staffing. For this reason, the opinions of both recruiters and job applicants on the effectiveness of personnel selection methods is of great importance, as they can have an important impact on recruitment practice facilitating successful employment (Woźniak, 2012, 2019).

According to the Directions 2017 report, the greatest investments on the Polish labour market are represented by companies from France, Germany, Spain and the United Kingdom. In addition, the latest Nielsen report, commissioned by CCI France Pologne (French-Polish Chamber of Commerce), 75% of the French organisations surveyed regard Poland's investment attractiveness as positive or very positive and the competences of Polish employees as very high. However, they also rate employee availability on the labour market as very low. Hence, it is important that the recruitment and selection process is carried out efficiently to guarantee access to qualified staff. In addition, Polish companies are also becoming more attractive to foreign employees. According to the Ministry of Family, Labour and Social Policy, in 2017, approximately 250,000 work permits were issued to foreign workers, almost 100% higher than in 2016, and district labour offices registered approximately 1.8 million statements of intention to employ foreign workers from businesses: almost 40% higher (Employment of foreigners in Poland, 2018). In response to this growing interest in the Polish labour market, the personnel selection process should be open to new environments. In addition, a greater familiarity with preferred selection methods will allow potential foreign employees to be more prepared for

interviews and to better understand the idiosyncrasies of the new market. Furthermore, the new environment brings new challenges regarding "distance recruitment", and with it, the use of ICT tools, which are regarded as being not as fair as traditional methods (Woźniak, 2019). From this perspective, employers facing a "talent shortage" would be advised to accommodate the preferences of candidates, as the use of an inappropriate method can lead to withdrawal from the entire selection process (Hausknecht, Day, & Thomas, 2004; Truxillo & Bauer, 2011).

Summarising, recruitment and selection are the key strategic domain in human resources management. As was mentioned, research and practice in the field of HR need to take into considerations macro issues (examining HR system more broadly), as well as micro issues (examining individual differences and apperception). In that research, both perspectives were included. What is well established is that candidates make inferences about companies based on how they are treated in the selection process (Chapman et al., 2005). Therefore, it is reasonable to further explore the opinions and needs of potential employees and how the recruitment and selection process can be used to shape a desirable brand for the employer. It is the people who choose to take part in the recruitment process who then apply for a position, and our present findings may indicate which selection tools are preferred by desirable employees. Another possible approach is the obtained knowledge that fits with the idea of supporting business practice through science, increasing professionalisation in the field of HRM. The authors are aware that the study has some limitations. Therefore, it is recommended that further studies should be performed involving larger groups of recruiters with matching groups of work positions, as this may offer a further insight into how the selection process should best be formulated. Future research should also adapt a multilevel perspective to display whether validities of selection methods at the individual level are associated with the organisational level.

References

1. Armstrong, M. (2007). *Zarządzanie Zasobami Ludzki [Human Resource Management]*. Kraków: Oficyna & Wolters Kluwer Business.
2. Backhaus, K., and Tikoo, S. (2004). Conceptualizing and researching employer branding. *Career Development International, 9, 5,* 501-517, doi: 10.1108/13620430410550754.
3. *Barometer of employment prospects 2018.* Retrieved from http://www.manpowergroup.pl/ wpcontent/uploads/2017/12/Barometr_Manpower_Perspektyw_Zatrudnienia_Q1_18_PL _www.pdf, 10.10.2018.
4. *Barometer of employment prospects 2019.* Retrieved from https://www.manpowergroup. com/wps/wcm/connect/ec952d82-f46e-4502-a513d376cacf6278/PO_PO_1Q19_Release. pdf?, 2.01.2019.

5. Chapman, D.S., Uggerslev, K.L., Carroll, S.A., Piasentin, K.A., and Jones, D.A. (2005). Applicant attraction to organizations and job choice: A meta-analytic review of correlates of recruiting outcome. *Journal of Applied Psychology, 90, 5,* 928-944, doi: 10.1037/0021-9010.90.5.928.

6. Chirkowska-Smolak, T., and Grobelny, J. (2014). Wykorzystanie metod doboru personelu oraz przekonania profesjonalistów na temat ich trafności prognostycznej [Use of personnel selection methods and the views of professionals regarding their predictive validity]. *Zarządzanie Zasobami Ludzkimi [Human Resource Management], 96, 1,* 125-141.

7. Cowling, A. (2000). *Strategiczne zarządzanie zasobami ludzkimi [Strategic management of human resources]*. Kraków: Oficyna Ekonomiczna.

8. Dale, M. (2013). *Skuteczna rekrutacja i selekcja pracowników [Effective recruitment and selection of employees]*. Kraków: Oficyna Ekonomiczna.

9. *Directions 2017. Negative economic shocks. Stress-tests of the Polish economy in 2017,* Retrieved from https://www.slideshare.net/DeloittePolska/raport-kierunki-2017-negatywne-szoki-gospodarcze-stresstesty-polskiej-gospodarki-w-2017-r, 28.11.2019.

10. *Employment of foreigners in Poland.* Retrieved from https://psz.praca.gov.pl/rynek-pracy/statystyki-i-analizy/zatrudnianie-cudzoziemcow-w-polsce, 3011.2019.

11. Furnham, A. (2008). HR Professionals' beliefs about, and knowledge of, assessment techniques and psychometric tests. *International Journal of Selection and Assessment, 16, 3,* 300-305, doi: 10.1111/j.1468-2389.2008.00436.x.

12. Hausknecht, J.P., Day, D.V., and Thomas, S.C. (2004). Applicant reactions to selection procedures: An updated model and meta-analysis. *Personnel Psychology, 57,* 639-683.

13. Hunter, J.E., and Hunter, R.F. (1984). Validity and utility of alternative predictors of job performance. *Psychological Bulletin, 96, 1,* 72-98, doi: 10.1037/0033-2909.96.1.72.

14. Jarecki, W. (2012). *Rekrutacja pracowników [Recruitment of employees]*. Szczecin: Economicus.

15. Kawka, T., and Listwan, T. (2004). Pozyskiwanie pracowników [Recruitment of employees]. In: T. Listwan (ed.), *Zarządzanie Zasobami Ludzkimi [Human Resources Management]* (pp. 76-101). Warszawa: C.H. Beck.

16. Lichtarski, J.M. (2007). Specyfika doboru pracowników do struktur zadaniowych w teorii i praktyce [The specificity of selecting employees for task structures in theory and practice]. *Zarządzanie Zasobami Ludzkimi [Human Resource Management], 6,* 25-40.

17. Lipińska-Grobelny, A. (2010). Rola testów psychologicznych w ocenie przydatności zawodowej kandydatów do pracy [The role of psychological tests in assessing the professional suitability of candidates for work]. In: Z. Goral (ed.), *Kontrola pracownika. Możliwości techniczne i dylematy prawne [Employee control. Technical possibilities and legal dilemmas]* (pp. 467-480). Warszawa: Wydawnictwo Wolters Kluwer.

18. Marek, J. (2008). *Pozyskiwanie i dobór personelu: kształtowanie zatrudnienia w organizacji [Acquisition and selection of staff: shaping employment in the organization]*. Warszawa: Difin.

19. *Nielsen Report. 25 years of Polish-French partnership. French investments in Poland* (2019). Retrieved from https://assets.kpmg/content/dam/kpmg/pl/pdf/pl-raport-kpmg-i-ccifp-25-lat-polsko-francuskiego-partnerstwa-pl.pdf , 2911.2019.

20. Osgood, C.E., Suci, D.J., and Tannenbaum P.H. (1957). *The measurement of meaning.* Urbana: University of Illinois Press.

21. Sajkiewicz, A. (1999). *Zasoby ludzkie w firmie [Human resources in the company]*. Warszawa: Poltext.

22. Suchar, M. (2008). *Rekrutacja i selekcja personelu [Recruitment and personnel selection]*. Warszawa: C.H. Beck.

23. Truxillo, D. M., and Bauer, T. N. (2011). Applicant reactions to organizations and selection systems. In: S. Zedeck (ed.), *APA handbooks in psychology. APA handbook of industrial and organizational psychology, 2. Selecting and developing members for the organization* (pp. 379-397). Thousand Oaks, CA, Sage: American Psychological Association.

24. Witkowski, T. (2007). *Nowoczesne metody doboru i oceny personelu [Modern methods of personnel selection and evaluation]*. Kraków: Wydawnictwo Profesjonalnej Szkoły Biznesu.

25. Wood, R, Payne, T. (2006). *Metody rekrutacji i selekcji pracowników oparte na kompetencjach [Methods of recruitment and selection of employees based on competences]*. Kraków: Oficyna Ekonomiczna.

26. Woźniak, J. (2012). *Współczesne systemy motywacyjne [Modern incentive systems]*. Warszawa: PWN.

27. Woźniak, J. (2019). Akceptacja różnych form narzędzi selekcyjnych – przegląd literatury i wstępne wyniki badania [Fairness assessment of different forms of traditional and ICT-based selection tools: review of literature and first results of empirical study]. *Zarządzanie Zasobami Ludzkimi [Human Resource Management], 5,* 11-37.

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