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The role of intangible resources in shaping the financial potential of high technology enterprises on the example of CD Projekt SA

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Abstract

Motivation: As a result of economic changes over the last few decades, the structure of enterprise resources has changed significantly. Therefore, their development potential is concentrated on intangible resources. A reflection of these changes is the emergence of the Resource-Based View of the Firm (RBV) which has its roots in the works of scientists such as: J.A. Schumpeter, A. Marshall, or E.H. Chamberlin. The importance of the resource theory is mainly based on the technological potential, people's knowledge or the improvement of management techniques.

Aim: The aim of the article is to propose a method for assessing the strength and direction of the impact of intangible resources on the financial potential of high-tech enterprises. In the article, as a case study, the impact of intangible resources on the financial potential of CD Projekt SA was presented. from the high-technology industry (Section C, subclass 26.20.) in 2011–2019. The choice of the company as the research object was primarily

determined by the type of business activity, the high position of the enterprise among the fastest growing companies and a significant share of intangible resources.
Results: To achieve the aim of the article, the soft modeling method was used which allows to study the relationship between directly unobservable variables. In the constructed soft model, two unobservable (hidden) variables constituting the internal model were adopted: intangible resources (IR) and financial potential (FP). Hidden variables were defined based on the potential set of indicators (observable variables). Specification of the model of the soft impact of intangible resources on the financial result of high-tech enterprises based on the concept of the resource theory. Identification of the most important variables shaping the intangible resources of high technology enterprises, their impact on the financial potential of enterprises, together with the analysis of the dynamics of changes. Defining proposals for recommendations for high-tech companies based on the results of empirical research.

Keywords: soft model; intangible resources; financial potential; high technology enterprises
JEL: C31; E22; G32; O34

1. Introduction

The modern economy is based on the development of enterprises that play a key role in shaping social welfare. The process of globalization has contributed to the search for such competitive advantages that will enable the development of companies regardless of where they conduct business. This is especially true of the high-tech industry. The analysis of the results of research conducted by scientists around the world shows that the key features of enterprises are currently playing a pivotal role in maintaining the company's strategic value. Among them, we can distinguish protection of intellectual property, building the capital of relationships and trust with clients, or the development of specialist knowledge and skills of the company's employees. These are intangible resources that build the company's resilience to their imitation by competition. Resilience became especially important during the Covid-19 pandemic. Broken supply chains or lockdown demonstrate the fundamental importance of intangible resources not only in the company's development, but also in the struggle for survival as well. The pandemic also accelerated the digital transformation of the economy which offers new opportunities to seek competitive advantages.

The aim of the article is to propose a method for assessing the strength and direction of the impact of intangible resources on the financial potential of high-tech enterprises. CD Projekt SA was presented as a case study. The statistical data comes from the company's financial statements for 2011–2019. The impact of intangible resources (IR) on the financial potential (FP) was investigated with the use of the soft modeling method which enables the study of relationships between directly unobservable variables. Non-measurable variables were defined on the basis of a selected set of observable variables from the financial statements. The proposed specification of a soft model and observable variables available in financial statements prepared in accordance with the principles

of international financial reporting standards (IFRS) enable the implementation of the proprietary model for the analysis of other companies.

The article consists of six main sections. After the introduction, a literature review was carried out, indicating the key achievements of the creators of the resource theory of the enterprise. The next part presents the soft modeling method, its advantages and disadvantages, and the justification for its choice. The next section contains the results of an empirical study based on data on the examined entity. The results of the model estimation, its substantive and statistical verification as well as the analysis of the values of non-measurable variables are presented. The article ends with a discussion and conclusions. The discussion includes an assessment of the results of theoretical and empirical research as well as the need to continue research. The conclusions show the added value of the article and recommendations.

2. Resource-based view of the company

The roots of the RBV (Resource-based view of the company) can be traced back to the 1930s thanks to the works of Chamberlin (1933), who created the foundations of the resource theory of the enterprise. A special place in the history of the RBV concept is occupied by Penrose (1959) *The theory of the growth of the firm* in which the British economist of American origin paid special attention to the importance of the company's resources in the theory of enterprise growth. They have not been defined in the traditional way as factors of production, but as unique production resources that can be used in various ways. From Penrose's point of view, the limits of a company's growth come from within, and optimal growth involves a balance between the exploitation of existing resources and the development of new ones. The work of Penrose in the eyes of the RBV is considered in the world of science as the beginning of the resource approach (Newbert, 2007, pp. 121–146; Peteraf, 1993, pp. 179–191; Wernerfelt, 1984, pp. 171–180); although some scientists question this (Rugman & Verbeke, 2002, pp. 769–780).

A continuation of the development of RBV theory was the search for an answer to the question why companies from the same industry achieve different results. In the first place, determinants in the external environment were sought which contributed to the emergence of the paradigm of external factors (Porter, 1980). The answer to this concept was the paradigm of internal factors based on the works of Birger Wernerfelt, who claimed that the company's results depend to a greater extent on internal than external factors. Wernerfelt (1984, p. 171) wrote that "for the company, resources and products are two sides of the same coin. Most products require a service of several resources, and most resources can be used in several products. By determining the size of a company's operations in different product markets, it is possible to infer the minimum necessary resource commitments. Conversely, by defining a resource profile for a company optimal activity can be found in the product market". This is one

of the most dominant theoretical views in the strategic resource analysis literature (Barney et al., 2011, pp. 1299–1315; Ferreira et al., 2014, pp. 131–144; Lockett & Wild, 2014, pp. 372–390). Hence, in the paradigm of internal factors the effectiveness of a company in achieving results is based on resources (Sutanto & Sudarsono, 2018, pp. 587–595). Therefore, the following question arose: what resources controlled by the company are the source of the competitive advantage? (Barney & Clark, 2007).

Jay Barney is another precursor of the RBV theory who has greatly contributed to the development of the resource-based approach with his work. Jay Barney's main assumptions underlying RBV relate to resource properties, i.e., heterogeneity and lack of mobility among market participants in each industry. The heterogeneity of resources determines the occurrence of differences in resources, and imperfect mobility allows these differences to persist over time. Barney (1991, pp. 103–105) believed that a company with a unique bundle of resources can achieve a competitive advantage defined as "above normal profits" or "excellent performance". He also noted that the potential resources of the enterprise, which are the source of long-term competitive advantage, must be valuable, scarce, imperfect in imitation, and have no substitutes (Scheme 1). However, recent studies show that resources do not necessarily meet the rarity criterion and still build a competitive advantage (Frery et al., 2015, pp. 69–77; Warnier et al., 2013, pp. 1359–1379).

RBV contributed to the interdisciplinary approach to the category of enterprise by combining various scientific areas of marketing, entrepreneurship, psychology and management. A derivative theory based on the RBV is the KBV (Knowledge-based view) (Kogut & Zander, 1992, pp. 383–397; Pike & Ross, 2011, pp. 268–293). This concept assumes that the key factor of the enterprise is the effective creation and transfer of knowledge. The enterprise should strive to create conditions in which it is possible to integrate knowledge emphasizing the role of individuals as creators, not the entire organization (Grant, 1996, pp. 109–122).

The concept of intellectual capital was also developed on the basis of RBV. According to Edvinsson (1996, p. 368), intellectual capital is the difference between the market value and the book value of an enterprise (Arszułowicz, 2019, p. 101). He defines it as knowledge, experience, technologies, customer relations, and professional skills that give the organization a competitive advantage in the market. According to Sveiby (1997, pp. 73–97), intellectual capital is defined as human capital, that is, employees' competencies and experience as well as knowledge; internal structural capital, i.e., patents, concepts, models, IT systems, administrative systems, organizational culture; and external structural capital, i.e., relations with customers and suppliers, trade brand, reputation and image of the company. The main feature of intellectual capital is its intangible aspect. Although intellectual capital can be reflected in the material form of a carrier, its idea is still intangible. In this article, the company's intangible resources, which are components of intellectual capital, will be classified

into the following categories: human resources (human capital), technological, IT, and legal resources (structural capital), and relational resources (relational capital). Previous research on intellectual capital is measured mainly by methods based on market capitalization and return on assets (Table 1.).

It is worth emphasizing that research on intangible resources, intellectual capital, and knowledge concerns one range of components. There is a positive relationship between resources such as: skills and know-how, IT systems, trademarks and relations with contractors and clients, and effectiveness, because it is reflected in the presence of intellectual capital in the enterprise (El-Bannany, 2008, pp. 487–498). In research on intangible resources in addition to the methods listed in Table 1, the following methods were used: scoring methods (BSC — Balanced Scorecard, HCI — Human Capital Intelligence, Skandia Navigator ™, VCS ™ — Value Chain Scoreboard ™), methods of direct measurement of intellectual capital (Technology Broker , HRCA — Human Resources Costing and Accounting, IVM — Inclusive Valuation Methodology, IAV — Intangible Assets Valuation, TVCTM — Total Value Creation, AFTF ™ — Accounting for the future) (Sveiby, 2010, pp. 3), regression methods (Maaloul & Zeghal, 2015, pp. 66–90) and the DEA method (Data Envelopment Analysis) (Campisi & Costa, 2008, pp. 170–183). In this article, the soft modeling method will be used which has not so far been widely used in research on intangible resources of an enterprise.

While both tangible and intangible resources are considered a source of heterogeneity in the structure of the enterprise, they are not equal in the eyes of the achieving competitive advantage and excellent performance. Most of the scientists mentioned above point out that material resources are a weak source of competitive advantage especially in the long run. They are an inseparable factor of the enterprise, but they ceased to be the dominant one. On the opposite side, there are intangible assets which are identified as more important determinants for achieving excellent performance.

To sum up, the RBV provides a theoretical explanation of why intangible assets are a source of extraordinary corporate performance. Industry, services and agriculture increasingly feel the role played by intangible resources in the process of achieving above-average profits and high productivity. It seems that research on the essence of intangible resources in high technology industries is particularly important due to the change in the structure of the company's resources over the last decades. Nevertheless, the need to study intangible resources in various industries is increasingly emphasized by scientists (Liu et al., 2019; Wang et al., 2020). Although intangible resources do not answer all questions regarding the company's success, they undoubtedly determine the financial potential at an increasing pace.

3. Methods

The article hypothesized that the intangible resources of high-tech enterprises have a strong impact on the level of financial potential of these companies. Both intangible resources (IR) and financial potential (FP) are immeasurable (hidden) variables that must be defined using a set of observable variables. Investigating the relationships between them requires the use of an appropriate method that enables the analysis of directly unobservable variables and the relationships between them. Such possibilities are provided by soft modeling (Wold, 1980, pp. 333–346).

The soft model consists of two parts: the internal (theoretical) model and the external model (measure) which are simultaneously used in the process of model estimation and verification (Perło, 2020, pp. 91–108). This means that the obtained results will depend on both models. Internal model describes the theoretical relations between hidden variables. It examines the impact of intangible resources on the financial potential of enterprises. When determining hidden variables, a deductive approach is adopted which means that the starting point for the definition of hidden variables is economic theory. Then the indicators are referred to as reflecting. In turn, the relations between unobservable and observable variables constitute an external model that shows how indicators reflect their hidden variables. It is assumed that hidden variables are linear combinations of their indicators.

The internal model presents the following linear equation:

$$FP_t = \alpha_1 IR_t + \alpha_2 + \varepsilon_t, \tag{1}$$

where:

FP_t — endogenous hidden variable at time t,
IR_t — exogenous hidden variable at time t,
α_i — structural parameters of the model, i=1, 2;
ε_t — random component.

The diagram of the internal and external model is presented in Scheme 2. Hidden variables: endogenous and exogenous were defined by means of reflecting indicators, which by definition, should be characterized by a strong correlation with each other. Therefore, one should be guided by substantive considerations and not rely on classic selection methods while selecting them. Observable variables analyzed in soft modeling can be defined as stimulants that have a positive effect on the hidden variable or as destimulants that have a negative effect on the unobservable variable.

The soft model is estimated using the partial least squares (PLS) method. This method simultaneously estimates the parameters of the measurement model and the theoretical model (Jöreskog & Wold, 1982 pp. 1–54; Kock & Mayfield, 2015, pp. 113–130; Lee et al., 2013, pp. 1705–1722; Servera-Francés et al., 2005, pp. 159–205; Tenenhaus et al., 2005, pp. 159–205; Wold, 1980, pp. 334–339;). As a result of estimation in addition to these parameters, we

also obtain estimates of the value of the hidden variable which can be treated as a synthetic measure. These values depend not only on external relations but on the relationships between complex phenomena assumed in the internal model as well. Estimates of the values of unobservable variables do not have a content-related interpretation, but changes in their values can be interpreted. If the estimates of weights and factor loadings for the indicators being stimulants of a given observable variable are positive and for those being destimulants they are negative, then the higher value of this variable indicates a higher level of the phenomenon understudy in a given object. By interpreting the order of these numbers, a comparative analysis is carried out.

According to the stages of classical econometric modeling, before analyzing the results, it should be verified substantive and then the statistical. Assessment of the parameters of external and internal relations must be consistent with the adopted theoretical description. The quality of the soft model is verified by measures belonging to the "classics" of econometrics based on the estimated values of hidden variables as values observed. These are the squares of the multiple correlation coefficients (R2) or the standard deviations of the parameter estimates.

The statistical properties of the soft model are checked mainly on the basis of the Stone–Geisser test (S–G test) which is a measure of the accuracy of the prediction made on the basis of the model in relation to the "trivial" prediction and the so-called Tuckey's cut (Perło, 2015, pp. 109–117). These are methods specific to soft modeling. The S–G test, so named by H. Wold, is not a typical statistical test. The procedure of examining the significance of variables is completely different and it constitutes a kind of test. The values of the S–G test are not limited downstream while the upper limit is 1. If the test value is negative, the soft model has a worse predictive property than the trivial prediction. In the case of the test value is equal 1, the forecasts are faultless. When the value is equal 0, the forecast quality from the model and the trivial forecast are identical.

To determine the value of the S–G test, the parameters of the soft model should be estimated L-fold. For each parameter of the external and internal relation, the standard deviation of the obtained L of its estimators should be determined. Then, the assessment of the significance of the model parameters is performed using the "2s" rule. This method is called "Tukey's Cut Method".

Soft modeling has many advantages. Among them, one can distinguish such functionalities as testing the strength and direction of the relationship between hidden variables, i.e., those that do not have unambiguous equivalents among the observable variables as well as the possibility of indicating indicators that reflect their hidden variable the most or performing a linear order of the examined objects based on the results of estimates of hidden variables. The advantages also include the lack of strict statistical assumptions which occur, for example, in the maximum likelihood method the use of which requires knowledge (or assumptions) of the probability distribution of the model variables. It

is very often difficult to achieve in empirical analyzes. However, in modeling based on the least squares method — such knowledge is not required. Weak (soft) assumptions about the correlation of certain variables are sufficient. Another positive aspect is the possibility of verifying the model estimates — both substantive and statistically. On the other hand, the disadvantage of soft modeling is its linear nature. The empirical data of many economic phenomena are non-linear which makes it impossible to apply this method.

The soft modeling method can be used to analyze time series and cross-sectional series. The article proposes a case study on one company (facility), the data of which constituted a time series (2011–2019). It is possible to use the specified soft model for the simultaneous analysis of a research sample consisting of many companies (cross-sectional series).

The constructed soft model was used to analyze the data of CD Projekt SA from the high-technology industry (Section C, subclass 26.20.) in 2011–2019. The choice of the company as the research object was primarily determined by: the type of business activity, the high position of the enterprise among the fastest-growing companies, and a significant share of intangible resources. The nine-year research period was included due to the availability of empirical data. The CD Projekt capital group includes CD Projekt, CD Projekt Red and GOG.com. In 2020 CD Projekt was the first in the Forbes ranking of 100 largest Polish private companies (Forbes, 2020). Activities of CD Projekt SA mainly cover the production of computer games and the digital distribution of programs and films by other developers. The company's mission is to create the best games in the world which is systematically confirmed by the company's achievements.

Hidden variables: intangible resources (IR) and financial potential (FP) were defined with the help of a set of indicators that meet the substantive and statistical criteria for the selection of variables as well as positively verified by all methods of model evaluation including those specific for soft modeling. The final set of observable variables is presented in Table 2. Due to the need to obtain comparability of data in the analyzed years, all observable variables are presented as relative values — per employee or in percentages.

The hidden variable IR (intangible resources) has been defined on the basis of four indicators — representatives of various intangible resources within the concept of intellectual capital. Computer software should be classified as a technological resource within the framework of structural capital. Patents, licenses, copyrights and trademarks are IT and legal resources within intellectual property that are also classified as structural capital. Human resources including development work as well as remuneration and other employee benefits are included in human capital. Due to the nature of the study, it was not possible to identify relational resources based on the available data.

The financial potential reflects the potential investment opportunities and financial ratios such as profitability, liquidity, and solvency (Ponomarenko et al., 2012). The hidden variable FP (financial potential) was defined on the basis of six

indicators — key financial data contained in the report showing the current situation of the company. These are the basic indicators of financial potential. Gross profit informs about the financial condition of the enterprise and allows to determine the financial potential of the company. Revenues inform about the level of the company's sales potential. Equity is the value of economic resources contributed to the company by owners (shareholders, stockholders, partners) and resources generated by the company in the course of its operations. Total assets inform about the general assets of the enterprise. ROE (the return on equity ratio) informs what part of the net financial result is attributable to the unit of equity capital employed. It is a measure of benefits, especially for capital owners, due to its involvement in an economic entity. ROA (the return on assets indicator) informs about the company's ability to generate profit and assess the effectiveness of asset management. It allows to determine the company's ability to constantly generate positive cash flows that are able to cover future, potential financial liabilities.

4. Results

The estimation of the soft model parameters results in the estimation of the external and internal relations. The estimated parameters were positively verified in terms of content and statistics thanks to which their interpretation is possible. Due to the fact that a deductive approach was adopted in the soft modeling process, the analysis of results covers factor loadings which are correlation coefficients between the explanatory variables and the hidden variable. Most of the indicators of the IR hidden variable significantly affect it because their values oscillate between 0.56 and 0.96 (Table 3). The greatest impact on the shaping of the potential of intangible resources in CD Projekt SA have human resources (IR04 — 0.9557). In 2011–2019 the surveyed company increased gross wages and derivatives per employee by an average of 8% per year. These changes, however, were heterogeneous, but were proportionate to the material costs related to the implementation of new projects implemented by the company. For example, in 2015 there was over 100% increase in human resources as a result of the development work carried out by the company to draw up innovative products. This is a positive tendency proving the significant impact of human resources on the development of CD Project SA The results of soft modeling also indicate a strong influence of technological resources as well as IT and legal resources on the shaping of intangible resources of the examined company (IR01 — 0.7280; IR02 — 0.5603). Between 2011 and 2019, spending on computer software, patents, licenses, copyrights and trademarks showed moderate variation and an upward trend, which is also positive. The only indicator with a lower estimated impact on intangible resources is expenditure on development work per one employee (IR03 — 0.3173). This indicator defines the human resources component, which based on another measurable variable (IR04), showed the greatest impact on the hidden variable IR, which means that

the low value of the IR03 indicator does not lower the previously demonstrated key role of human resources in building the level of the company's intangible resources.

Indicators of the hidden variable FP have an even stronger influence than in the case of the IR variable. The factor loadings are between 0.75 and 0.98. This proves the high impact of all observable variables on the financial potential of CD Projekt SA The indicator FP01 has the highest impact on the FP variable — gross profit in PLN million per employee (FP01 — 0.9764). The financial situation of the surveyed enterprise compared to high technology companies is very good which is confirmed by all the analyzed indicators of the FP variable. CD Projekt SA in the analyzed period. It has transformed from a medium-sized economic entity to a large enterprise with competitive financial potential. The return on equity ratio (ROE) of the audited company in 2011–2019 was more than twice as high as the sector average for GPW companies, which means how much more profit was generated by CD Projekt SA from equity capital (WSE, 2021b). The FP05 indicator in 88% reflects the hidden variable FP, and the FP06 indicator, i.e., the rate of return on assets (ROA) — is almost 92%. The ROA value is more than three times the sector average for GPW companies (WSE, 2021a). This proves the effectiveness of the analyzed company in terms of obtaining profits from the invested capital.

The sensitivity of the soft model to the inclusion of an additional variable in it — the growth rate of gross profit was analyzed. The other variables indicated were impossible to implement. The obtained results do not differ significantly from those obtained in the model presented in the article. The parameters of the statistical verification of the modified model indicated a slightly lower quality of the model. For example, the coefficient of determination was approx. 0.02 lower than in the originally estimated model. Therefore, the model specified in the article has not been changed.

Table 4 shows selected descriptive statistics of the IR and FP hidden variable indicators. All indicators are characterized by a sufficiently high level of differentiation, as evidenced by the values of the classical coefficient of variation.

The results of the external model confirmed the correct selection of observable variables defining their hidden variables through their significant impact on IR and FP as well as relatively small errors in the estimation of all parameters (estimated parameters do not exceed the "2s" rule — according to the Tuckey's cut method) and also the relatively high quality of estimates confirmed by the values of the determination coefficients, except for the IR03 indicator (R2=0.3173).

The relationships between the hidden variables are evidenced by the estimates of the internal model. The results obtained by the PLS method are presented in the equation (2):

$$\hat{FP}_t = \underset{(0,0027)}{0,8962}\, IR_t - \underset{(0,0502)}{1,7839},\ R^2 = 0,8032. \qquad (2)$$

It should be stated that the quality of the internal model is very good as evidenced by the coefficient of determination equal to 0.8032. The estimated parameters can also be assessed positively — in accordance with Tuckey's rule of cuts. The model also has favorable prognostic properties as evidenced by the positive value of the S–G test, both overall and for individual indicators of the endogenous FP (Table 5). According to the adopted thesis, the intangible resources of a high-tech enterprise have a strong influence on the level of the company's financial potential (0.8962). They are an indispensable element that sets the priorities for the development potential of CD Projekt SA

As a result of estimating the internal model, we also obtain estimates of the values of hidden variables, which are used to organize the objects (years), indicating the direction of changes of the studied quantities. In the case of the two analyzed hidden variables (IR and FP), their values are usually higher and higher each year which means a positive tendency both in terms of shaping the level of intangible resources and the increase in financial potential (Chart 1). The highest values are visible in 2015 when the company achieved above-average profits from a new product launched on the market. CD Projekt SA skillfully used its potential for further development of the company by investing in new products doubling human capital resources. The high technology industry is developing dynamically. Resilience, i.e., resistance to changes in the environment, thanks to the ability to quickly respond to the needs of the global market and the use of innovative technological solutions, is the key to the survival and development of high technology companies. In order to take advantage of this an appropriate level of intangible resources is necessary which — as it results from the estimates of the soft model — greatly influences the generation of the company's financial potential.

5. Conclusion

The conducted research confirms the global trend related to the key role of intangible resources in achieving financial results. Among all the groups of intangible resources, human resources constituted the most important intangible factor of the examined enterprise. Similar conclusions were put forward by other researchers using the regression function or the DEA method for the analysis. Employees' skills and competences are of the greatest importance in today's economy of intangible resources. The high technology industry sets the trend which the world economy is following and claims what their financial potential is mainly built on which is confirmed by the review of the theory and research on intangible resources presented in this article. Since 2015, CD Projekt SA has started a systematic increase in expenditure on human resources which contributed to the achievement of revenues several times higher in the following years of its operation. Such action proves that long-term investments in human resources in the appropriate life cycle of the enterprise can bring financial success in the future. However, intangible resources require deeper and horizontal

analysis, but not all data about them is measurable and available for use in empirical analysis. Mainly due to the fact that the current method of measuring human resources is a cost method that does not measure the potential of human resources but only determines their cost. The next step in the discussion of intangible resources is the question: what types of intangible resources are the most important in specific enterprise life cycles?

The following conclusions from empirical research show a similar relationship between intangible resources and the financial potential of an enterprise. The model results clearly indicate that there is a positive correlation between corporate intangible assets and financial performance, as the inputs (investments) made to own intangible assets have a positive impact on the financial performance of companies (Kaymaz et al., 2019, pp. 27–49). The higher the value of intangible assets owned by a company, the greater the company's ability to generate profits, and investors will appreciate the company (as evidenced by large market capitalization in companies), which will increase the company's value (Mohammed & Ani, 2020, pp. 379–391; Qureshi & Siddiqui, 2020, pp. 26–57).

The formulated hypothesis that intangible resources of a high-tech enterprise have a strong impact on the shaping of the level of the financial potential of these companies has been positively verified. The analysis of the strength and direction of the impact of intangible resources on the financial potential of a technology company has shown that human resources are the main generator of success but not the only one. The synthesis and penetration of all intangible resources in the enterprise is the financial success of CD Project SA The recommendation for the audited entity is to further increase the level of human resources and develop digital competencies allowing for the implementation of the strategy dynamically changing conditions. The proposed model based on standard empirical data can be used to analyze the studied dependence in other economic entities. The authors of the article also point out that the synergistic management of tangible and intangible resources in today's economy based on knowledge and information acquires a unique character due to the changing structure of resources. The Covid-19 pandemic has shown the potential of intangible resources and the extent to which their flexibility allows the continuous operation of most enterprises. The conclusions drawn from the analysis clearly indicate that intangible resources have always existed in the economic environment, but only recently have their growing influence been noticed and the key importance assigned to them.

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Appendix

Table 1.
The list of methods of measuring intellectual capital

Market capitalization methods	Return on assets methods
– Market Value to Book Value ratio	– Economic Value Added® — EVA®
– Market Value Added	– Calculated Intangible Value
– q-Tobin's ratio	– Knowledge Capital Earnings™
– Investor Assigned Market Value	– Value Added of Intellectual Coefficient™
– Invisible Balance Sheet	
– FiMIAM — Financial method of intangible assets measurement	

Source: Own preparation.

Table 2.
List of IR and FP hidden variable indicators

Hidden variable	Symbol	Name of the observable variable	Unit
IR	IR01	computer software	million PLN per employee
	IR02	patents, licenses, copyrights, trademarks	million PLN per employee
	IR03	development works	million PLN per employee
	IR04	salary and other employee benefits	million PLN per employee
FP	FP01	gross profit	million PLN per employee
	FP02	total revenues	million PLN per employee
	FP03	equity capital	million PLN per employee
	FP04	total assets	million PLN per employee
	FP05	ROE — return on equity	interest
	FP06	ROA — return on assets	interest

Source: Own preparation.

Table 3.
Estimation results of the external model parameters and estimation errors obtained with the Tukey test

Hidden variable	Measurable variable	Weight (deviation)	Factor loading (deviation)	Coefficient of determination R_2
IR	IR01	0.3419	0.7280	0.5300
		(0.0041)	(0.0082)	
	IR02	0.2800	0.5603	0.3139
		(0.0110)	(0.0114)	
	IR03	0.1375	0.3173	0.1007
		(0.0024)	(0.0098)	
	IR04	0.5761	0.9557	0.9134
		(0.0038)	(0.0025)	

Hidden variable	Measurable variable	Weight (deviation)	Factor loading (deviation)	Coefficient of determination R_2
FP	FP01	0.2083	0.9764	0.9534
		(0.0686)	(0.1885)	
	FP02	0.1886	0.9338	0.8719
		(0.0642)	(0.1773)	
	FP03	0.1962	0.7560	0.5716
		(0.0769)	(0.1262)	
	FP04	0.2081	0.7995	0.6392
		(0.0699)	(0.1411)	
	FP05	0.1626	0.8824	0.7787
		(0.0892)	(0.1847)	
	FP06	0.1766	0.9193	0.8451
		(0.0829)	(0.1871)	

Source: Own preparation based on the soft modeling method, based on data taken from CD Projekt (2011–2019).

Table 4.
Selected descriptive statistics of the IR and FP hidden variable indicators

Hidden variable	Symbol	Average	Standard deviation	Classic coefficient of variation (%)	Minimum value	Maximum value
IR	IR01	27.38	13.67	49.93	7.45	52.43
	IR02	153.20	22.57	14.73	117.94	185.92
	IR03	438.03	393.27	89.78	132.73	1 281.71
	IR04	279.87	113.05	40.39	165.35	518.49
FP	FP01	1 319.38	1 045.18	79.22	301.38	3 717.68
	FP02	1 944.00	1 220.78	62.80	815.20	5 050.72
	FP03	2 600.02	1 189.85	45.76	1 213.81	3 906.63
	FP04	3 206.64	1 265.30	39.46	1 648.75	4 649.36
	FP05	0.22	0.18	80.77	0.03	0.67
	FP06	0.17	0.14	79.16	0.02	0.51

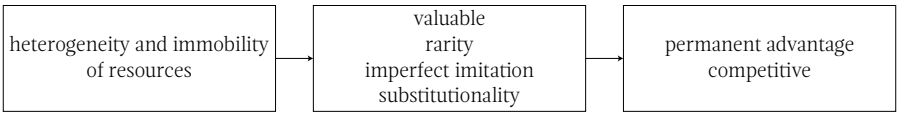
Source: Own preparation.

Table 5.
Stone–Geisser (S–G) test results

Variable	S–G test
FP01	0.3544
FP02	0.2283
FP03	0.3861
FP04	0.3879
FP05	0.1532
FP06	0.2310
general S–G test	0.3334

Source: Own preparation based on the soft modeling method, based on data taken from CD Projekt (2011–2019).

Scheme 1.
Relationship between resource characteristics and sustainable competitive advantage



Source: Barney (1991, p. 112).

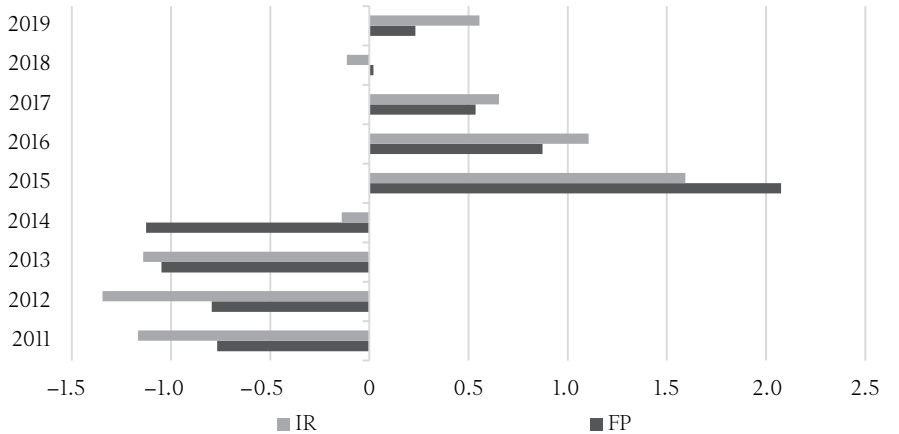
Scheme 2.
Scheme of the model of the soft impact of intangible resources on the financial potential

where:

internal relationship,
external relationship,
hidden variable,
indicator

Source: Own preparation.

Chart 1.
Estimation of the values of the IR and FP hidden variables in 2011–2019



Source: Own preparation based on the soft modeling method, based on data taken from CD Projekt (2011–2019).