

Conceptual Determinants of Development of Intellectual Capital of Construction Enterprises

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Abstract The presence and effective implementation of the intellectual potential of construction enterprises is important for creating unique competitive advantages as a response to challenges caused by globalization, the era of the knowledge economy, as well as the development of communication and information technologies. The purpose of the study is to provide a comprehensive understanding of the factors that contribute to the development of intellectual capital in construction enterprises; development of an algorithm for thorough response by the enterprise to the action of determinants. The following methods were used: Analysis and synthesis, induction and deduction when studying the variety of determinants of the development of intellectual capital; grouping in the process of classifying determinants; statistical methods in the process of researching the reporting of construction enterprises; systematic approach in the process of forming an algorithm of actions aimed at ensuring effective management of the intellectual capital of construction enterprises; abstraction to generalize research results and outline significant trends in changing indicators that reflect the development of individual components of intellectual capital. In the paper, the determinants of the development of intellectual capital are grouped according to the classification features important for Ukrainian construction enterprises. The indicators, the monitoring of which is necessary in the process of implementing a conscious response to the action of the determinants of the development of the intellectual capital of construction enterprises, are studied on the example of Ukrainian construction enterprises.

Keywords intangible assets; construction industry; unique competitive advantages; added value; individual enterprise

1 Introduction

Intellectual capital is one of the most important subtypes of capital in the modern world. Its development is gaining more and more importance in various industries, in particular in construction. When considering the possibilities of ensuring a high level of competitiveness of construction enterprises, it is important to realize that intellectual capital should be considered

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as a source of forming the competitiveness of not only an individual enterprise, but also contribute to increasing the potential of the industry and increasing the level of competitiveness of the national economy.

Intellectual capital encompasses intangible assets of an organization, including knowledge, expertise, and creativity, which add to its overall value. It comprises both human and non-human components, such as the skills and knowledge of employees, the organization's culture and systems, and its associations with stakeholders, including customers, suppliers, and partners^[1]. The development of intellectual capital in certain industries depends not only on the consciousness and efforts of the management of certain enterprises. The impetus and creation of prerequisites for the development of the intellectual capital of enterprises should be supported by the presence of favourable conditions at the level of the national economy. Therefore, when studying the mechanisms that determine and limit the reproduction of intellectual capital and its individual components at the level of the national economy, it is important to create additional sources of formation and development of intellectual capital at the industry level and the level of enterprises and learn to use them effectively.

Thus, intellectual capital is an important characteristic of increasing the competitive advantage of a nation, which, in particular, is considered in the paper of Vo and Tran^[1]. As a result of the research, the authors came to the conclusion that European countries have reached the highest level of national intellectual capital, while African countries have the lowest level. An assessment of the level of national intellectual capital of the world's largest economies based on open data allowed the authors to conclude that the United States of America reached the highest level. Therefore, the obtained results confirm a close connection between the level of national intellectual capital and the level of national income, which actualizes research devoted to the development of intellectual capital.

For the construction enterprises of Ukraine, the strengthening of individual components of intellectual capital has a great potential to ensure the synergy of their development and future achievements. The study of Ahmed, et al.^[2] considered the impact of intellectual capital on the efficiency and value of companies through investing in specific components of intellectual capital and proved the importance of developing an intellectual capital management system. Fitriaty, et al.^[3] identified intellectual capital as the key to efficient use of resources and a prerequisite for encouraging companies to create additional value.

The paper of Umihanic, et al.^[4] focuses on the creation of additional value of the enterprise at the expense of intellectual capital. Therefore, the lack of a purposeful and consistent practice of intellectual capital management makes it impossible to achieve ambitious development goals, which are quite achievable if a reasonable approach to the formation and development of intellectual capital is used. The structural and logical model of managing the development of the enterprise's intellectual capital is consistently and reasonably considered in the paper of Litvinov, et al.^[5]. The study of measures that affect the development of the intellectual capital of enterprises is based on the unification of the stages that ensure this process. Therefore, the possibilities of applying the approach proposed by the authors are limited by the need to take into account the specifics of the development of enterprises in the construction industry.

Considering the impact of intellectual capital on knowledge management of a construction

enterprise, Kondratiuk and Lych^[6] focused attention on the issues of adaptation of a construction enterprise to changes in the external environment, ensuring competitiveness and sustainable development precisely by developing an effective knowledge and intellectual capital management system. The authors proved the importance of the development of individual components of the intellectual capital of construction enterprises. However, the issue of creating the prerequisites necessary to achieve the planned result remained outside the area of attention.

Thus, summarize that an effective method of increasing business value involves creating conditions for the development of the enterprise's intellectual capital and achieving unique competitive advantages as a result of these gains. The search for means that will allow focusing on the realization of the potential of individual determinants of the development of the intellectual capital of construction enterprises will provide the necessary tools and focus attention on achieving goals, whether it is an increase in the level of competitiveness or an increase in the capitalization of the enterprise.

The purpose of the study is to provide a comprehensive understanding of the factors that contribute to the development of intellectual capital in construction enterprises. The paper aims to identify and justify the most important conceptual determinants that are crucial to the success of construction enterprises in building their intellectual capital. The applied orientation of the research was achieved by developing an algorithm, the implementation of which allows to systematically solve the issue of tracking and identifying the determinants of the development of intellectual capital of construction enterprises, forecasting the power and direction of their influence, evaluating changes and further analysing the thoroughness of the decision.

2 Materials and Methods

In the process of research, methods were used that made it possible to investigate the determinants of the development of intellectual capital of construction enterprises and to develop an algorithm, the implementation of which enables organizing the process of identifying determinants, forecasting the strength and direction of their influence, evaluating changes for the possibility of conducting an analysis of the effectiveness of responding to actions caused by the implementation of previously adopted decisions.

Analysis and synthesis, induction and deduction were used in the process of researching the diversity of the determinants of the development of intellectual capital of construction enterprises; in the process of developing an algorithm that allows to consistently implement stages aimed at increasing the efficiency of intellectual capital management by consistently identifying determinants, creating a system for their accounting, as well as analysing the results of decisions made. Grouping as a method of economic analysis was used in the process of classification of the determinants of the development of intellectual capital, taking into account the industry specifics of construction enterprises.

Statistical methods of analysis were used in the process of researching the annual reports of construction enterprises, in particular, the indicators characterizing the value of intangible assets and their share in the total value of non-current assets and the total value of the enterprise's assets were evaluated; an analysis of indicators reflecting the state of equity capital of the investigated construction enterprises, the volumes of their long-term provision and current

liabilities was carried out. Also, using statistical methods, the dynamics of gross profit and net financial result of the studied construction enterprises were investigated.

The systematic approach was applied in the process of forming an algorithm of actions aimed at ensuring the identification of determinants, forecasting the strength and direction of their influence on the development of intellectual capital, evaluating changes for the possibility of accounting and analysis for making sound decisions. Abstracting made it possible to generalize the research results obtained for construction enterprises, as well as to outline significant trends in the change of reporting indicators of Ukrainian construction enterprises, which reflect the development of individual components of intellectual capital and their impact on the results of financial and economic activity. In the research process, the annual financial statements of Ukrainian construction enterprises were used, namely:

- JSC “Darnytskyi zavod ZBK”^[7];
- JSC “Zavod zalizobetonnykh konstruktsiy im. Svitlany Kovalskoyi”^[8];
- PJSC “Kyivmetrobud”^[9];
- PJSC “Ukrbudresursy”^[10];
- PJSC “Boryspilskyi kombinat budivelnykh materialiv”^[11];
- PJSC “Budivelna kompaniya Komfortbud”^[12];
- PJSC “Budinzhenermerezha-5”^[13];
- PJSC “Domobudivnyy kombinat No.4”^[14];
- PJSC “Zavod budivelnykh vyrobiv-1”^[15];
- PJSC “Lutskyi domobudivnyy kombinat”^[16];
- PJSC “Poznyaky-zhyl-bud”^[17];
- PJSC “Poltavskyi domobudivnyy kombinat”^[18];
- PJSC “Trest zhytlobud-1”^[19];
- PJSC “HC Kyivmiskbud”^[20].

The research was conducted in three stages. At the first stage, the determinants of the development of intellectual capital of construction enterprises were grouped, taking into account their diversity and the feasibility of further use in the process of increasing the efficiency of the enterprise’s intellectual capital management. On the second stage, an algorithm was developed, the application of which makes it possible to consistently and thoroughly implement the stages aimed at increasing the efficiency of intellectual capital management of construction enterprises, which will ensure the manageability and transparency of the process. At the third stage, on the example of Ukrainian construction enterprises, the calculation of indicators was carried out, the analysis of which allowed drawing conclusions about the state of affairs in the management of individual elements of the intellectual capital of construction enterprises.

3 Results

Globalization and the rapid development of communication and information technologies have created the conditions, under which the competitiveness of an enterprise is less and less based on traditional tangible assets, and increasingly depends on intangible ones. For construction enterprises, intellectual capital is an integrative resource that unites three components (human resources, structural capital and capital of relations), creating a synergistic effect due

to the anticipatory expanded reproduction of ideas and knowledge. To build and maintain intellectual capital, an enterprise should invest in the knowledge and expertise of its employees through recruiting, training, and retention. Additionally, protecting intellectual property through patents, trademarks, and copyrights can help maintain a competitive advantage. Building strong customer relationships and collaborating with partners can provide access to new ideas and expertise. A culture that promotes innovation, creativity, and knowledge sharing is crucial, as is investing in the latest technology and infrastructure. Collecting and analyzing data can improve decision-making, identify new opportunities, and create new products and services, contributing to the growth of intellectual capital^[3].

In addition, it is necessary to take into account the main components of the intellectual capital of the enterprise. An enterprise's intellectual capital can be built through various components, such as a strong trademark that protects its brand and reputation and creates customer loyalty. A strong brand can also help differentiate the enterprise from competitors and create customer loyalty, requiring investment in advertising, marketing, and customer experience. The knowledge, skills, and experience of employees are a critical component of intellectual capital, and investing in recruitment, training, and retention of talented employees can help maintain a competitive advantage^[2]. Organizational capital, including efficient systems, processes, and culture, can help streamline operations and improve performance. Lastly, innovation and technological capital, achieved through research and development and the use of technology to enhance products and services, are essential components of intellectual capital that enable enterprises to adapt to changing market conditions and maintain a competitive edge.

Intellectual capital can be categorized into three main components: Human capital, structural capital, and relational capital. Human capital refers to the knowledge, skills, and experience of employees and other stakeholders that contribute to the organization's success. Structural capital includes the infrastructure, processes, and systems that support the organization's operations, such as information systems, patents, trademarks, and other intellectual property. Relational capital refers to the relationships and networks that the organization has built with customers, suppliers, partners, and other stakeholders^[4].

In order for intellectual capital to play a stimulating function and create unique competitive advantages for business, it is necessary to investigate the prerequisites for its development. The processes and phenomena that determine the formation and development of the intellectual capital of construction enterprises require a response from the management system, as they can have both stimulating and destructive effects. Therefore, the primary task is to determine the conceptual determinants of the development of intellectual capital of Ukrainian construction enterprises, which will provide a basis for the effective reproduction of intangible assets and the choice of a thorough direction of the development of intellectual capital.

Based on the research of Drobot^[21], it is possible to determine of the development of the intellectual capital of construction enterprises, taking into account industry specifics. The classification given by the researcher has been revised and clarified, contradictions that have not been resolved in the paper have been reconciled. The classification features that should be thoroughly used in the study of the intellectual capital of construction enterprises include the nature of the influence of determinants on the development of intellectual capital, the scope,

direction and duration of the influence, as well as the sources of their occurrence. The grouping of the determinants of the development of intellectual capital of construction enterprises according to classification features, covering the most important processes and phenomena in terms of the degree of influence, is shown in Figure 1.

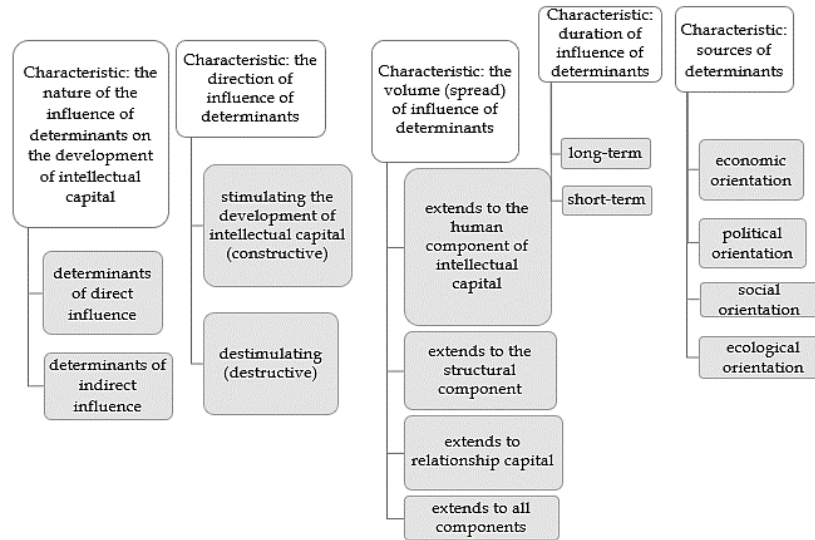


Figure 1 Classification of determinants of development of intellectual capital of construction enterprises

The creation of conditions for the practical application of the determinants of the development of intellectual capital of construction enterprises, grouped according to the relevant characteristics, is proposed to be ensured as a result of the implementation of an algorithm of actions aimed at the “automation” of the process of identifying determinants, forecasting the strength and direction of their influence in order to ensure favourable conditions for the development of intellectual capital through optimal use of internal and external resources, recording changes for the possibility of evaluation and analysis. The algorithm will include the following sequence of actions:

- assessment of the determinants of the internal and external environment, which can potentially affect the size and quality of individual components of intellectual capital;
- identification of determinants in accordance with the proposed classification and fixation of features characteristic of a separate determinant;
- forecast of the impact of determinants on the development of the intellectual capital of a construction enterprise;
- assessment of the resources needed to implement the stimulating function of the determinants of the development of the construction enterprise (or the resources needed to minimize the negative impact);
- obtaining a thorough decision regarding the next targeted actions, taking into account the ratio of indicators obtained at the two previous stages;
- fixation in the short-term and long-term periods of the result of the implementation of the decision made at the previous stage (quantitative measurement and qualitative assessment

of the indicators, by which the accounting of intellectual capital is ensured at the construction enterprise);

· analysis of the consequences of decisions regarding the response to the determinants of the development of intellectual capital.

The implementation of the proposed algorithm is possible through the implementation of a software solution or by adding the necessary duties to the job descriptions of employees of construction enterprises. Based on the components that were included in the intellectual capital formation scheme in previous studies (primarily intangible and market assets), the authors were able to analyse the development of individual elements as a stage of the proposed algorithm on the example of construction enterprises^[7–20]. Table 1 provides information on the value of intangibles of construction enterprises and their share in non-current assets and assets of an enterprise based on data from the annual financial statements of construction enterprises.

Table 1 Absolute and relative indicators of the amount of intangible assets of construction enterprises (at the beginnings of 2020 and 2021)

Name of the enterprise	Value of intangible assets, UAH thousand		Value of the company's assets, UAH		Share of intangible assets in the total value of assets, %		Share of intangible assets in the total value of non-current assets, %	
	2020	2021	2020	2021	2020	2021	2020	2021
JSC “Darnytskyi zavod ZBK”	127	123	242760	175381	0.052	0.07	0.157	0.126
JSC “Zavod zalizobetonnykh konstruksiy im. Svitlany Kovalskoyi”	179	66	3388505	3169740	0.005	0.002	0.015	0.008
PJSC “Boryspilskyi kombinat budivelnykh materialiv”	42	149	59008	56608	0.071	0.263	0.153	0.442
PJSC “Budivelna kompaniya Komfortbud”	0	0	110604	110604	-	-	-	-
PJSC “Domobudivnyy kombinat No.4”	280	1374	438278	440974	0.064	0.312	0.23	1.098
PJSC “HC Kyivmiskbud”	1947	1552	10100657	12167612	0.019	0.013	0.441	0.382
PJSC “Kyivmetrobud”	49	43	4994268	4714374	0.001	0.001	0.022	0.013
PJSC “Poznyaky-zhyl-bud”	284	90	948070	1368336	0.03	0.007	0.961	0.335
PJSC “Ukrbudresursy”	0	0	15910	15691	-	-	-	-

Note that according to the data of Table 1, PJSC “Budivelna kompaniya Komfortbud”^[12] and PJSC “Ukrbudresursy”^[10] do not have intangible assets on the balance sheet, which indirectly indicates the unsatisfactory state of existence and accounting of this type of enterprise assets. These two construction enterprises, as well as for PJSC “Boryspilskyi kombinat budivelnykh materialiv”^[11] have the lowest amount of the total value of assets, which (for comparison)

is less than 1% of the value of assets of PJSC “HC Kyivmiskbud”^[20], which has the highest indicator of the value of assets among the considered construction enterprises. PJSC “HC Kyivmiskbud”^[20] has the highest absolute indicator of the value of intangible assets of construction enterprises. Summarizing, the authors note that the available data indicate that the share of intangible assets in the total value of assets has decreased in several of the considered construction enterprises. Thus, the authors have rather low indicators of the build-up of intangible assets by Ukrainian construction enterprises. According to the data of the analysis, they constitute only one third of the total number of investigated enterprises.

Another factor influencing the intellectual resources of construction enterprises, according to the scheme of the formation of intellectual capital, are sources of financing, the amount of which should be sufficient to perform stimulating functions and ensure the expanded reproduction of the intellectual capital of enterprises. Table 2 combines information containing the absolute values of indicators that reflect the state of equity capital of the construction enterprises under study, as well as the volumes of long-term security and current liabilities.

Table 2 Absolute indicators of equity, long-term security and current liabilities of construction enterprises (at the beginnings of 2020 and 2021)

Name of the enterprise	Cost of the company's equity capital, UAH		Cost of long-term obligations and collateral of the enterprise, UAH		Cost of current liabilities and security of the enterprise, UAH		Liabilities, UAH	
	2020	2021	2020	2021	2020	2021	2020	2021
JSC “Darnytskyi zavod ZBK”	41877	25500	60000	60000	140883	89881	242760	175381
JSC “Zavod zalizobetonnykh konstruktiv im. Svitlany Kovalskoyi”	264451	172540	757000	630000	2367054	2367200	3388505	3169740
PJSC “Boryspilskyi kombinat budivelnnykh materialiv”	7224	8357	59	59	51725	48192	152235	142414
PJSC “Budinzhenermerezha-5”	49357	49357	0	0	11436	17994	59008	56608
PJSC “Budivelnna kompaniya Komfortbud”	–1453	–1892	44642	44642	67415	67854	948070	1368336
PJSC “Domobudivnyy kombinat No.4”	187149	202987	6102	6266	245027	231721	34738	36243
PJSC “HC Kyivmiskbud”	1615664	1525242	5075016	8147536	3409977	2494834	10100657	12167612
PJSC “Kyivmetrobud”	9023	–105277	1123170	0	3862075	4819651	4994268	4714374
PJSC “Lutskyi domobudivnyy kombinat”	41862	48885	4178	1599	106195	91930	60793	67906
PJSC “Poltavskyi domobudivnyy kombinat”	15080	14743	2751	2751	16907	18749	438278	440974
PJSC “Poznyaky-zhyl-bud”	4435	438924	270977	438924	672658	946281	5471119	6281401
PJSC “Trest zhytlobud-1”	2299465	2305189	1320338	1165279	1851316	2810933	42025	237092
PJSC “Ukrbudresursy”	–10119	–10224	0	0	26029	25915	15910	15691
PJSC “Zavod budivelnnykh vyrobiv-1”	–4230	–24259	0	0	46255	261350	110604	110604

The negative equity values of PJSC “Budivselna kompaniya Komfortbud”^[12], PJSC “Zavod budivselnykh vyrobiv-1”^[15], PJSC “Kyivmetrobud”^[9] and PJSC “Ukrbudresursy”^[10] in 2021 indicate that the enterprises operate using borrowed funds. PJSC “Poznyaky-zhyl-bud”^[17], PJSC “Boryspilsky kombinat budivselnykh materialiv”^[11] and PJSC “Domobudivnyy kombinat No.4”^[14], PJSC “Trest zhytlobud-1”^[19], PJSC “Lutsky domobudivselnyy kombinat”^[16] and PJSC “Budinzhenermerezha-5”^[13] increased the value of equity capital, while other investigated enterprises decreased it. More thorough conclusions require the study of relative indicators, which will provide information about the share of each of the elements in the composition of funding sources. Table 3 shows data containing indicators that reflect the share of equity capital, long-term and current liabilities of construction enterprises in the amount of resources at their disposal.

Table 3 Relative indicators of the share of equity capital, long-term security and current liabilities of construction enterprises (at the beginnings of 2020 and 2021)

Name of the enterprise	Share of equity capital in the total value of liabilities, %		Share of long-term liabilities and collateral in the total value of liabilities, %		Share of current liabilities and collateral in the total value of liabilities, %	
	2020	2021	2020	2021	2020	2021
JSC “Darnytsky zavod ZBK”	17.25	14.54	24.716	34.211	58.034	51.249
JSC “Zavod zalizobetonnykh konstruksiy im. Svitlany Kovalskoyi”	7.804	5.443	22.34	19.875	69.855	74.681
PJSC “Boryspilsky kombinat budivselnykh materialiv”	12.242	14.763	0.1	0.104	87.658	85.133
PJSC “Budinzhenermerezha-5”	83.645	88.171	0	19.38	31.787	
PJSC “Budivselna kompaniya Komfortbud”	−1.314	−1.711	40.362	40.362	60.952	61.349
PJSC “Domobudivnyy kombinat No.4”	42.701	46.032	1.392	1.421	55.907	52.548
PJSC “HC Kyivmiskbud”	15.996	12.535	50.244	66.961	33.76	20.504
PJSC “Kyivmetrobud”	0.181	−2.233	22.489	0	77.33	102.233
PJSC “Lutsky domobudivselnyy kombinat”	68.86	71.988	6.873	2.355	174.683	135.378
PJSC “Poltavsky domobudivselnyy kombinat”	3.441	3.343	0.628	0.624	3.858	4.252
PJSC “Poznyaky-zhyl-bud”	0.468	32.077	28.582	32.077	70.95	69.156
PJSC “Trest zhytlobud-1”	5471.66	972.277	3141.792	491.489	4405.273	1185.589
PJSC “Ukrbudresursy”	−63.602	−65.158	0	0	163.602	165.158
PJSC “Zavod budivselnykh vyrobiv-1”	−3.825	−21.933	0	0	41.821	236.294

Negative values clearly demonstrate that losses due to the activities of PJSC “Budivselna kompaniya Komfortbud”^[12], PJSC “Kyivmetrobud”^[9], PJSC “Zavod budivselnykh vyrobiv-1”^[15] and PJSC “Ukrbudresursy”^[10] are compensated using the funds raised. The share of long-term liabilities and securities in the total value of liabilities of PJSC “Budivselna kompaniya Komfortbud”^[12], PJSC “Boryspilsky kombinat budivselnykh materialiv”^[11], PJSC “Do-

mobudivnyy kombinat No.4”^[14], PJSC “Budinzhenermerezha-5”^[13], PJSC “Zavod budivelnykh vyrobiv-1”^[15] and PJSC “Ukrbudresursy”^[10] remained unchanged. PJSC “Kyivmetrobud”^[9] got rid of long-term liabilities in 2021; JSC “Zavod zalizobetonnykh konstruktsiy im. Svitlany Kovalskoyi” (−0.025 g.p.)^[8], PJSC “Lutskyy domobudivelnny kombinat” (−0.045 g.p.)^[16], and PJSC “Trest zhytlobud-1” (−26.503 g.p.)^[19] reduced their share. PJSC “HC Kyivmiskbud” (+0.167 g.p.)^[20], PJSC “Poznyaky-zhyl-bud” (+0.035 g.p.)^[17] and JSC “Darnytskyy zavod ZBK” (+0.095 g.p.)^[7] slightly increased the share of long-term liabilities and collateral. For greater clarity, Figure 2 shows the dynamics of the volume of profit of the construction enterprises under study.

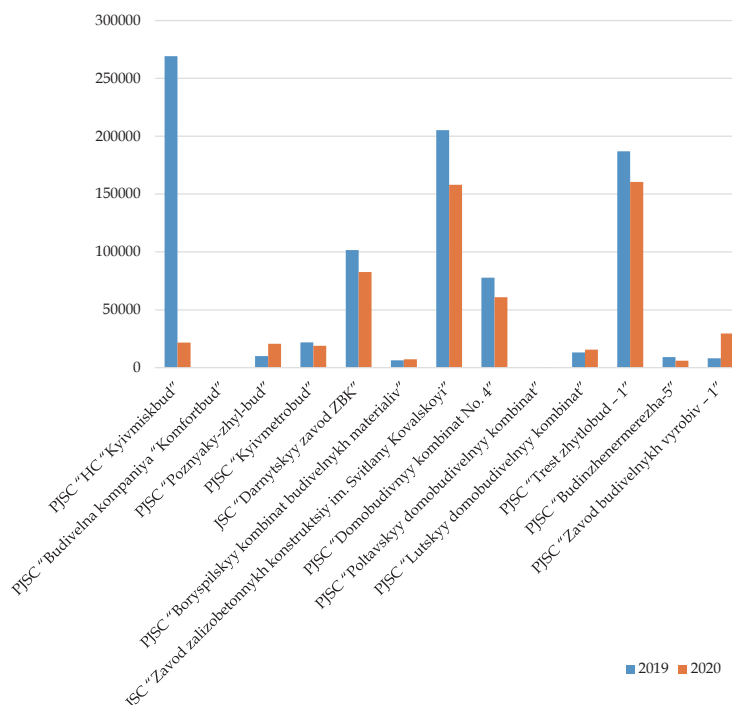


Figure 2 Dynamics of the gross profit of the construction enterprises under study in 2019–2020, UAH

The data shown in Figure 2 indicated that, with the exception of PJSC “Poznyaky-zhyl-bud”^[17] and PJSC “Boryspilsky kombinat budivelnykh materialiv”^[11], PJSC “Poltavsky domobudivelnny kombinat”^[18], PJSC “Lutskyy domobudivelnny kombinat”^[16] and PJSC “Zavod budivelnykh vyrobiv-1”^[15], the rest of the construction companies under study significantly worsened the indicators that reflect their total income. Thus, the decrease in the indicator amounted to −247487 UAH in PJSC “HC Kyivmiskbud”^[20], −2959 UAH in PJSC “Kyivmetrobud”^[9], −19073 UAH in JSC “Darnytskyy zavod ZBK”^[7], −47151 UAH in JSC “Zavod zalizobetonnykh konstruktsiy im. Svitlany Kovalskoyi”^[8], −16834 UAH in PJSC “Domobudivnyy kombinat No.4”^[14], −26556 UAH in PJSC “Trest zhytlobud-1”^[19], −3204 UAH in PJSC “Budinzhenermerezha-5”^[13]. PJSC “Budivelnna kompaniya Komfortbud” had a zero value of the indicator^[12]. Data reflecting the results of financial and economic activities of the Ukrainian construction enterprises under study are presented in Figure 3.

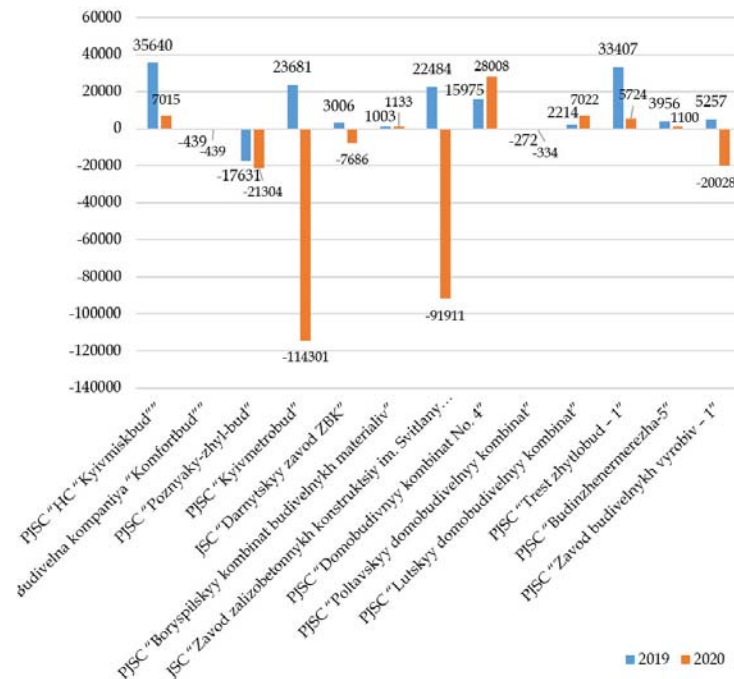


Figure 3 Dynamics of the net financial result of the construction enterprises under study in 2019–2020, UAH

Based on the given data, the authors conclude that only six of the studied construction enterprises had a positive value of the indicator reflecting the financial result of the enterprise after taxation. These include PJSC "HC Kyivmiskbud"^[20], PJSC "Boryspilsky kombinat budivelnikh materialiv"^[11], PJSC "Domobudivnyy kombinat No.4"^[14], PJSC "Lutsky domobudivnyy kombinat"^[16], PJSC "Trest zhytlobud-1"^[19] and PJSC "Budinzhennermerezha-5"^[13]. PJSC "Boryspilsky kombinat budivelnikh materialiv"^[11], PJSC "Lutsky domobudivnyy kombinat"^[16] and PJSC "Domobudivnyy kombinat No.4"^[14] demonstrated positive dynamics of the indicator, which increased by 130 UAH, 4809 UAH and 12033 UAH, respectively. Characterizing the effectiveness of the financial and economic activities of the construction enterprises under study, it could be emphasized that there are many caveats regarding their effectiveness. The given data indicate insufficient attention to the formation and building up of intangible assets, as well as low indicators reflecting the overall results of their activities. Thus, the issue of accumulation and development of the intellectual capital of construction enterprises is often left out of the management's attention, and its effective use is achieved due to the use of only the material component of the capital of construction enterprises.

4 Discussion

The specificity and complexity of intellectual capital from the viewpoint of its measurement, the lack of a unified approach to its components, and the problem of its reflection in the reporting of Ukrainian construction enterprises required the search for measures that would achieve the goal of forming and developing intellectual potential. Separating and taking into account the determinants of the development of the intellectual capital of construction enter-

prises allows to prevent or minimize the destructive impact and purposefully create conditions for the formation of a positive synergistic impact at their expense. The research by Drobot^[21], devoted to an in-depth study of the essence of the determinants of the development of socio-economic systems and their classification, summarizes the available scientific approaches to the definition of determinism and its influence on the processes taking place in an enterprise. The classification proposed by the author is quite comprehensive and can be applied with different levels of detail depending on the research tasks.

Steinerowska-Streb and Glod^[22] considered the behavioral determinants of the development of Polish enterprises and their influence on the implementation of innovations. It was determined that enterprises that realize the importance of actualization of the intellectual potential of employees and embody the creative ideas of their employees in business practices are more innovative than the rest of the enterprises. In addition, it was found that the growth of innovation in a company occurs when the company supports the development of employees. Agreeing with the conclusions of the authors, it can be noted that the development of intellectual capital for construction enterprises also depends on the creation of conditions that encourage employees not only to accumulate new knowledge, but also to apply it during the activities of this particular enterprise.

The influence of intellectual capital in the conditions of turbulence and uncertainty of the environment on the results of the enterprise's activities, as well as the mediating role of intellectual capital in the value creation chain, was investigated in the paper of Foster, et al.^[23]. The authors' conclusions show that intellectual capital and environmental uncertainty have a significant impact on enterprise activities. The authors of this article would like to add that the value creation chain is an important tool for improving business efficiency for construction enterprises, and intellectual capital has a significant potential for the enterprise to achieve high results, which is not realized by Ukrainian construction enterprises.

Umihanic, et al.^[4] considered the possibilities of intellectual capital to create additional value, to form non-imitated differentiated value in relation to other competitors both in the conditions of the national market and at the global level. According to the authors of the research, a systematic approach to the management of the components of intellectual capital will allow achieving a synergistic effect, which will ensure an increase in the level of competitiveness of enterprises. Agreeing with these statements, the authors note that the systematic approach is the key to success in the process of creating additional value due to the use of components of intellectual capital. Research by Farooq, et al.^[24] is devoted to the study of market capitalization and intellectual capital as the main factors that influence investment decisions in corporations. Using the example of non-financial public corporations of the People's Republic of China, India and Pakistan, the co-authors found a significant positive impact of market capitalization on investment decisions and substantiated the important role of human capital, structural capital and the efficiency of capital use in the protection of industrial investments.

Pancencko and Titova^[25], using the example of industrial enterprises of the Baltic countries, conducted an analysis of the intellectual capital and competitiveness of the studied enterprises. The authors proved that more effective use of intellectual capital provides higher indicators of the company's competitiveness; however, the study emphasizes that other factors, such as

sources of financing, also affect the competitiveness of an enterprise. According to the obtained results of the analysis carried out in the paper, it is noted that a number of construction enterprises have zero values of indicators reflecting the value of intangibles (PJSC “Budivelna kompaniya Komfortbud”^[12], PJSC “Budinzhenermerezha-5”^[13], PJSC “Ukrbudresursy”^[10]), as well as dependence on external sources of financing, which worsens their competitive position relative to other investigated construction enterprises and requires the adoption of appropriate decisions to prevent the worsening of the situation.

The impact of intellectual capital, company growth and return on assets on the value of construction companies in Indonesia was investigated by Rahmayanti and Hidayat^[26]. The authors consider the influence of intellectual capital to be negative and insignificant in relation to the value of an enterprise. Thus, the authors emphasize the need to record and display the relevant indicators, without which a reasonable measurement of the connection between the investigated processes and phenomena is impossible. A study by Duff^[27] focuses on the importance of voluntary disclosure of information about intellectual capital, which emphasizes the need to map and create standards for identifying, measuring and displaying intellectual capital. In the development of the issue of disclosure of information about intellectual capital, the authors can add that the quality of disclosure processes depends on many factors, for example, the size of an enterprise, leverage, profitability and impact on the value of a company^[28, 29].

The research of Petty and Guthrie^[30] also emphasizes the need to develop a system that would ensure not only the measurement and management of intellectual capital, but also a timely and complete reflection of its structure and value in reporting. Considering the problem as a whole, the authors claim that intellectual capital plays an important role not only in determining the value of the enterprise, but also in ensuring the efficiency of the national economy. The given examples indicate that the level and quality of data that highlight the state of the intellectual capital of enterprises is insufficient in many industries. Therefore, this is not a local problem of the Ukrainian construction industry and needs to be solved in accordance with the strategic goals of the development of individual enterprises, national economies, and regions^[31–33].

Appah, et al.^[34], investigating the relationship between intellectual capital and company value, concluded that not all components of intellectual capital equally affect the creation of added value. According to their results, the added value of structural capital and the added value of relationship capital have a significant impact on the value of the company and vice versa — The added value of human capital did not show a significant impact on the value of a company. Potrich, et al.^[35] reached similar conclusions, arguing that the loss of knowledge is mostly related to human capital and specifying that rapid turnover, waste of knowledge, insufficient numbers of specialists, and absence of workers create risks for knowledge critical for a company. In the development of this thesis, the authors can add that the loss of knowledge is an inevitable risk for construction enterprises. Since there are problems of losing employees with valuable knowledge, there is a probability of the lack of necessary systematization and preservation of knowledge, or there is a lack of a knowledge management system^[36, 37].

The results of another research of Costa, et al.^[38] conducted on the example of Brazilian companies indicate a significant positive impact of investment in intellectual capital on com-

pany productivity. In addition, the authors prove that all components of intellectual capital play an important role in increasing return on assets and equity. Given that the classification of intellectual capital development determinants proposed in the paper is aimed at more precisely identifying processes and phenomena in their relationship with the expected results and manifestations of the development of intellectual capital of construction enterprises, it will be appropriate to focus attention and test hypotheses, according to which priority will be stimulated and will provide impacts, the manifestations of which will be obtained in the form of added value of structural capital and capital of relationships^[39–41]. At the same time, the authors of this article offer to ensure the development of the structural capital of construction enterprises as a complex of its components, empirically or with the use of mathematical modeling, selecting the quantity and quality of resources aimed at ensuring the development of the intellectual capital of a construction enterprise. In support of our proposed approach, Sucena, et al.^[42] presented the results of the research, according to which, on the example of construction companies in Portugal, it is proven that the management of intellectual capital affects the performance of construction companies, and investments in human capital ensure the growth of structural capital and, ultimately, relational capital.

The impact of intellectual capital on Polish construction companies is considered in the paper of Buszko and Mroziwski^[43]. Based on the developed method of evaluating the qualitative components of the intellectual capital of construction enterprises, as well as the relationship between the quality of intellectual capital and the growth of net profit, it was established that the higher the value of intellectual capital, the greater the growth of the net profit of a construction enterprise^[44, 45]. Evaluation of intangible assets and their dynamics on the example of Ukrainian construction enterprises and comparison of the obtained data with the amount of net profit made it possible to come to a conclusion about the identity of the research results of Polish construction enterprises and Ukrainian ones. In this regard, it is appropriate to recommend a set of measures aimed at increasing intellectual capital, in particular by using an algorithm that ensures consideration of the determinants of the development of intellectual capital of construction enterprises to increase profits and create a unique competitive advantage.

5 Conclusions

For construction enterprises, intellectual capital is an integrative resource that unites its components, creating a synergistic effect due to the extended reproduction of ideas and knowledge. In order for intellectual capital to play a stimulating function and create unique competitive advantages for business, it is necessary to effectively use the prerequisites for development. The classification of intellectual capital development determinants proposed in the paper is carried out by grouping the intellectual capital development determinants of construction enterprises according to classification features, which cover the most important processes and phenomena in terms of the degree of influence, given their diversity and the feasibility of their further use in the process of improving the efficiency of the intellectual capital management of construction enterprises. The characteristics, by which it is proposed to classify the determinants of the development of intellectual capital of construction enterprises, include the nature of the influence of the determinants on the development of intellectual capital, the direction of in-

fluence of determinants, the volume (spread) of influence of determinants, duration of influence of determinants, as well as the sources of determinants.

To ensure the conditions for the practical use of the determinants of the development of intellectual capital of construction enterprises, it is proposed to apply an algorithm of actions aimed at unifying the process. Ensuring the effectiveness of intellectual capital management of construction enterprises will be ensured by identifying determinants, forecasting the power and direction of their influence, recording changes for the possibility of analysis and informed decision-making, which will ensure manageability and transparency of the process. The proposed algorithm also takes into account the importance of ensuring the extended reproduction of the intellectual capital of construction enterprises. The calculation of indicators made it possible to draw conclusions about the unsatisfactory state of affairs in the management of individual elements of the intellectual capital of construction enterprises, which is manifested by the low amount of intangible assets and their mostly negative dynamics during the years under analysis.

Effective use of tangible and intangible capital components of a construction enterprise is possible only if sufficient attention is paid to both components. And if the owners and management pay enough attention to the provision and development of the material component, the issues of accumulation and development of intellectual capital often remain outside their attention. The research results can be used to conduct a factor analysis of each of the determinants of development considered in the paper and to identify the influence of each of the factors on the development of individual components of intellectual capital and the intellectual potential of construction enterprises as a whole.

References

- [1] Vo D H, Tran N P. Measuring national intellectual capital and its effect on country's competitiveness. *Competitiveness Review*. 2022, <https://doi.org/10.1108/CR-08-2021-0110>.
- [2] Ahmed A, Khurshid M K, Riaz Z, et al. Intellectual capital and firm value: The role of firm performance. *Journal of Management Info*, 2023, 9(3): 402–417.
- [3] Fitriaty F, Saputra M H, Eliyana D. Effect of intellectual capital on company performance and company value before and during COVID-19 pandemic. *Journal of Business Studies and Management Review*, 2022, 5(2): 226–232.
- [4] Umihanic B, Delic A, Cilimkovic D. Significance and evaluation of performance of intellectual capital. The 6th International Scientific Symposium Economy of Eastern Croatia - Vision and Growth. Ministry of Economy of Republic of Croatia, Osijek, 2017: 1171–1181.
- [5] Litvinov O, Malyshko V, Litvinova V. Structural-logical management model of development of intellectual capital of the enterprise. *Scientific Bulletin of the Odessa National Economic University*, 2019, 6: 107–120.
- [6] Kondratiuk Y, Lych V. Impact of intellectual capital on knowledge management of construction enterprise. *Business Navigator*, 2021, 3(64): 39–43.
- [7] JSC “Darnytskyi zavod ZBK”. Financial statements for 2020. Available from https://clarity-project.info/edr/01373298/finances?current_year=2020.
- [8] JSC “Zavod zalizobetonnykh konstruktsiy im. Svitlany Kovalskoyi”. Financial statements for 2020. https://clarity-project.info/edr/05523398/finances?current_year=2020.
- [9] PJSC “Kyivmetrobyud”. Financial statements for 2020. https://clarity-project.info/edr/01387432/finances?current_year=2020.
- [10] PJSC “Ukrbudresursy”. Financial statements for 2020. https://clarity-project.info/edr/04648809/finances?current_year=2020.

- [11] PJSC “Boryspil'skyy kombinat budivelnnykh materialiv”. Financial statements for 2020.
https://clarity-project.info/edr/05408059/finances?current_year=2020.
- [12] PJSC “Budivelna kompaniya “Komfortbud”. Financial statements for 2020.
https://clarity-project.info/edr/32253895/finances?current_year=2020.
- [13] PJSC “Budinzhennermerzha-5”. Financial statements for 2020.
https://clarity-project.info/edr/04013407/finances?current_year=2020.
- [14] PJSC “Domobudivnyy kombinat No.4”. Financial statements for 2020.
https://clarity-project.info/edr/05503160/finances?current_year=2020.
- [15] PJSC “Zavod budivelnnykh vyrobiv-1”. Financial statements for 2020.
https://clarity-project.info/edr/21517799/finances?current_year=2020.
- [16] PJSC “Lutskyy domobudivelnnyy kombinat”. Financial statements for 2020.
https://clarity-project.info/edr/30089004/finances?current_year=2020.
- [17] PJSC “Poznyaky-zhyl-bud”. Financial statements for 2020.
https://clarity-project.info/edr/24089818/finances?current_year=2020.
- [18] PJSC “Poltavskyy domobudivelnnyy kombinat”. Financial statements for 2020.
https://clarity-project.info/edr/01270581/finances?current_year=2020.
- [19] PJSC “Trest zhytlobud-1”. Financial statements for 2020.
https://clarity-project.info/edr/01270285/finances?current_year=2020.
- [20] PJSC “HC “Kyivmiskbud”. Financial statements for 2020.
https://clarity-project.info/edr/23527052/finances?current_year=2020.
- [21] Drobot S A. The essence of the determinants of development and their classification. *Scientific Bulletin of the Uzhhorod National University*, 2018, 22(1): 97–100.
- [22] Steinerowska-Streb I, Glod G. Innovations in Polish family firms. Exploring employee creativity and management practices that stimulate innovative thinking. *Journal of Entrepreneurship, Management and Innovation*, 2020, 16(1): 231–260.
- [23] Foster B, Saputra J, Johansyah M D, et al. Do intellectual capital and environmental uncertainty affect firm performance? A mediating role of value chain. *Uncertain Supply Chain Management*, 2022, 10(3): 1055–1064.
- [24] Farooq U, Tabash M I, Anagreh S, et al. How do market capitalization and intellectual capital determine industrial investment? *Borsa Istanbul Review*, 2022, 22(4): 828–837.
- [25] Pancenko E, Titova N. Intellectual capital and competitiveness of industrial enterprises of the Baltic countries. *Journal of Business Management*, 2022, 20: 100–117.
- [26] Rahmayanti M W, Hidayat W. The effect of intellectual capital growth on the value of the company. *The Journal of Contemporary Accounting and Economics Symposium 2018 on Special Session for Indonesian Study (JCAE 2018) - Contemporary Accounting Studies in Indonesia*. SciTePress, Vienna, 2018: 294–301.
- [27] Duff A. Intellectual capital disclosure: Evidence from UK accounting firms. *Journal of Intellectual Capital*, 2018, 19(4): 768–786.
- [28] Singhal S, Gupta S, Gupta V K. The impact of firm size, leverage, and profitability on the disclosure level of intellectual capital. *Finance: Theory and Practice*, 2022, 26(5): 49–59.
- [29] Salvi A, Vitolla F, Giakoumelou A, et al. Intellectual capital disclosure in integrated reports: The effect on firm value. *Technological Forecasting and Social Change*, 2020, 160: 120228.
- [30] Petty R, Guthrie J. Intellectual capital literature review: Measurement, reporting and management. *Journal of Intellectual Capital*, 2000, 1(2): 155–176.
- [31] Jain R, Husain A, Jussibaliyeva A, et al. A new hybrid algorithm for the resource constraint project scheduling problem. *Industrial Engineering and Management Systems*, 2022, 21(3): 492–502.
- [32] Nabieva M, Turmakhanbetova S, Shamisheva N, et al. Determinants of innovative development on the example of Kazakhstan. *Journal of Science and Technology Policy Management*, 2021, 12(4): 651–665.
- [33] Sinaj Z, Kasemi R, Cenolli S. Human resource management in public administration: Study on the performance measurement and emotional intelligence in the workplace in albanian public institutions. *Review of Economics and Finance*, 2022, 20: 845–850.
- [34] Appah T, Yuniarti S, Sisharini N, et al. Does profitability matter in the relationship between intellectual capital and firm value? *Media Ekonomi dan Manajemen*, 2023, 38(1): 57–70.
- [35] Potrich L N, Miranda Jr J, Selig P M, et al. Knowledge gains and losses to organizational resilience, from

- intellectual capital. The 23rd European Conference on Knowledge Management, 2022, 23(2): 928–936.
- [36] Berdykulova G M, Kamysbayev M K, Omarova A S, et al. Human resource management in a pandemic: The case of Kazakhstani company. ACM International Conference Proceeding Series. Association for Computing Machinery, Virtual, Online, 2021: 3492652.
 - [37] Atamanyuk I P, Kondratenko V Y, Kozlov O V, et al. The algorithm of optimal polynomial extrapolation of random processes. Lecture Notes in Business Information Processing, 2012, 115: 78–87.
 - [38] Costa C F R, Nossa S N, Nossa V, et al. The impact of investment in intellectual capital on firms' profitability. Revista de Administracao Mackenzie, 2022, 23(5): 1–24.
 - [39] Mingaleva Z, Aitkazina M A. Multi-agent model for financing innovative projects in agriculture. World Applied Sciences Journal, 2013, 24(2): 222–226.
 - [40] Krasnov A, Okanova A, Yeraliyeva Y, et al. Development of the financial policy of the eurasian economic union countries: Tax harmonization. Entrepreneurship and Sustainability Issues, 2020, 8(1): 138–149.
 - [41] Holmen R B. Productivity impulses from regional integration: Lessons from road openings. Insights into Regional Development, 2022, 4(4): 83–125.
 - [42] Sucena A, Matos F, Nunes A. Intellectual capital and performance: A case study of construction companies. The 23rd European Conference on Knowledge Management, 2022, 23(2): 1165–1174.
 - [43] Buszko A, Mroziewski M. The intellectual capital impact on Polish construction companies during the transformation period. Journal of Human Resource Costing & Accounting, 2009, 13(3): 206–220.
 - [44] Okunola J L, Fakunle S O. Community participation: A pragmatic solution to negative impacts of Covid-19 on household's socioeconomic lives. Insights into Regional Development, 2021, 3(4): 21–33.
 - [45] Maâlej A. The role of entrepreneurship and innovation in the environmental and economic dimensions of growth. Insights into Regional Development, 2022, 4(2): 85–95.