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quantity of another important resource, labor, directly depends on their features (amount). The cost of the object's life cycle depends on them. Therefore, every step to improve the management of input material and technical resources (MTR), including their cost, affects the economy of construction companies and the construction industry as a whole. When drawing up a BIM implementation plan for a construction project (BEP), modern companies include a section of 5D and 4D modeling. Up-to-date information on prices in construction is essential for the implementation and operation of 5D BIM at any stage of the life cycle. The efficiency of a whole arsenal of the latest methods of cost management, or Cost Engineering, Value Engineering, Project Management, Total Quality Management and others depends on timely, reliable information on resource cost and their current market price. The methodological basis for the formation of such data and their management needs further research.

These research and applied tasks determine the relevance of this dissertation, its purpose and content of further research.

Literature Review

It has been noted in the works of various researchers that it is necessary to use in the estimated calculations of current market (regional) prices for construction resources. With regard to pricing, setting and regulating the price of construction products [1, 2, 4], from the standpoint of efficiency (profitability) of investment activities [5, 22, 27, 29], from the perspective of planning and reducing customer costs, from the perspective of design and construction [23, 25]. It should be noted that the problem is complex. [1-4, 24, 25] formulated approaches to the formation of the structure of data banks of current market prices and some methods of indirect determination of the resource price.

In Ukraine, the first examples of creating databases on construction material costs for participants in the construction process are electronic database "Budtsina" developed by the team of research institute ASB under the leadership of Sudak V.S. and monthly periodical "Budprofi" [6] created for the regional construction market under the leadership of Rastagaeva S.A. in Kremenchuk, Poltava region. Since 2010, a lot of work in this direction is carried out by the state-owned enterprise "State Road Research Institute named after M.P. Shulgin [7].

It is advisable to consider the international experience for filling price directories for construction MTR, which are used to calculate the cost of construction. After all, in different countries this problem is solved differently.

In the Russian Federation and Belarus, there exist methods of collecting and processing statistical data to determine the weighted average current prices based on information on construction work by region [8, 9]. These techniques are based on contractors' information about past events – deliveries that have already taken place.

In Kazakhstan, the authorized state body quarterly calculates the weighted average or arithmetic mean of current prices by region based on department statistics from manufacturers of MTR and contractors [10].

Collecting statistics shows its objectiveness. However, the main set of data is the price reduction of manufacturers and information from contractors about the price of MTR used on construction sites, and not the data of real transactions for the sale of construction MTR.

In Turkey, the directory of market prices for construction materials, products and structures and the directory of market prices for construction works [11] are issued annually by a structural unit of the Ministry of Environment and Urban Planning of the Republic of Turkey. They are prepared on the basis of information provided voluntarily by participants in the construction MTR markets.

Most Spanish regions have their own price databases. They are usually mandatory for use by the state customer, but are developed and maintained by scientific and / or specialized orga-

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Table 7. Calculation of the seasonal component [30]

Quarter	2011	2012	2013	2014	2015	2016	2017	2018	Average	Seasonal component
1	2	3	4	5	6	7	8	9	10	11
I	745.0	-78.2	579.1	-1285.6	5951.6	-182.0	6174.6	14735.4	3330.0	-303.9
II	-702.1	424.2	230.0	-724.1	2161.6	3413.1	7227.9	18125.0	3769.5	135.6
III	-604.6	834.3	-438.6	-211.3	1088.6	3075.8	10117.4	18741.3	4075.4	441.5
IV	-309.1	655.1	-1053.4	-882.7	-89.0	4881.7	11032.9	12649.0	3360.6	-273.3
Total	-870.8	1835.4	-682.8	-3103.8	9112.8	11188.7	34552.9	64250.8	3633.8	

Conclusion

The results of practical implementation of the price monitoring system and its elements in the formation and maintenance of a database of prices of construction resources by the Directorate for Construction of Facilities for EURO 2012 in Lviv during the construction of Lviv Stadium for Euro 2012, in developing and implementing a price analysis system and the formation of information on current prices for building materials, products and structures in a special format for download in software packages to calculate the cost of construction, for comparative analysis of changes in the volume and cost of the Beskid tunnel at the stage of working documentation compared to the stage of tender offer, development of consolidated indicators of the cost of construction of heat supply networks, in the development and implementation of TOV "AC "Construction-Modern Technologies" system for monitoring the prices of major construction MTR in the regions of Ukraine as an information resource for participants in the construction process proved that analytical tools functional and economic diagnostics of market prices of material and technical resources by enterprises-participants of construction at construction of objects for the state customer increase efficiency for participants of construction. Software for the formation of a centralized price monitoring system (CMS), which should consist of a centralized database that will consolidate information from suppliers, as well as its management system (CMS), provides management with tools for successful project administration at all stages of the life cycle. The implementation of research results confirmed their reliability, practical value and cost-effectiveness.

References

1. Mir, M., Kabir, H. D., Nasirzadeh, F., & Khosravi, A. (2021). Neural network-based interval forecasting of construction material prices. *Journal of Building Engineering*, *39*, 102288. https://doi.org/10.1016/j.jobe.2021.102288.
2. Tugay, O. A., Zeltser, R. Y., Kolot, M. A., & Panasiuk, I. O. (2019). Organization of Supervision over Construction Works Using Uavs and Special Software. *Science and Innovation*, *15*(4), 23-32.
3. Bezuhlyi, A. O. Bibyk, Yu. M. & Tsynka, M. A. (2017) Propozytsii shchodo vdoskonalennia systemy koshtorysnoho tsinoutvorennia, *Dorozhnia haluz Ukrainy*, *6*, 41–43.
4. Zeltser, R. Y., Bielienkova, O. Y., Novak, Y., & Dubinin, D. V. (2019). Digital transformation of resource logistics and organizational and structural support of construction. *Science and innovation*, *15*(5), 38-51. https://doi.org/10.15407/scine15.05.034
5. Chan, J. K., Tam, C. M., & Cheung, R. K. (2005). Construction firms at the crossroads in Hong Kong: Going insolvency or seeking opportunity. *Engineering, Construction and Architectural Management*. doi:10.1108/09699980510584476
6. Rastiehaiev, S.A. (2002) Svidotstvo pro reiestratsiiu PL № 564 03.10.2002.

DOI: 10.37943/AITU.2021.40.39.006

7. «Monitorynh tsin na materialy» (2016). *DP «DerzhdorNDI»*. Available: https://dorndi.org.ua/ua/price-monitoring
8. Ob utverzhdenyy Ynstruktsyy o poriadke provedenyia monytorynha tsen (taryfov), rascheta yndeksov tsen v stroytelstve (2008) Postanovlenye Mynysterstva arkhytekturы y stroytelstva respublyky Belarus 15 sentiabria 2008 h. № 42.
9. Metodicheskie ukazaniya po razrabotka sbornykov (katalohov) smetnykh tsen na materyaly, izdelyia, konstruktsyy y sbornykov smetnykh tsen na perevozku hruzov dlia stroytelstva y kapytalnoho remonta zdanyi y sooruzhenyi (2000), Postanovlenye Hosstroia Rossyy ot 17dekabria 1999 № 80.
10. Hosudarstvennyi normatyv po monytorynhu tekushchykh tsen y raschetu smetnykh tsen stroytelnykh resursov (2015) Prykaz Predsedatelia Komyteta po delam stroytelstva, ZhKKh y zemelnykh resursov ot 3 yiulia 2015 hoda № 235-nк/
11. Podrobnyi analyz tsen na stroytelstvo (2019), Dyrektsyia vyssheho tekhnycheskoho soveta, Ankara: Turetskaia respublyka. Mynysterstvo okruzhaiushchei sredy y urbanyzma, 2019, p. 1201.
12. Baza vytrat na budivnytstvo Andaluzii (BCCA) (2020) Rada z pytan rozvytku ta zhytlovoho budivnytstva rehionalnoho uriadu Andalusii. Sevilskyi universytet,Shkola budivelnoi tekhniky Sevili ta Ofitsiina asotsiatsiia heodezystiv ta tekhnichnykh arkhite, Available: https://www.juntadeandalucia.es/organismos/ fomentoinfraestructurasyordenaciondelterritorio/areas/vivienda-rehabilitacion/planes-instrumentos/paginas/vivienda-bcca.html.
13. Internet portal tsin (2021) Tsentr vprovadzhennia ekonomichnoho ta orhanizatsiinoho budivnytstva «PROMOCJA». Available: https://www.sekocenbud.net
14. BISTYP – Prais-lyst na budivelni materialy, mashyny ta posluhy (2021) Wolters Kluwer. Available: https://www.profinfo.pl/bistyp.
15. McKnight, P. E., McKnight, K. M., Sidani, S., & Figueredo, A. J. (2007). *Missing data: A gentle introduction*. Guilford Press.
16. Gehrig, G., & Welfe, W. (Eds.). (1993). *Economies in transition: a system of models and forecasts for Germany and Poland*. Physica.
17. Aistrakhanov, D. D. (1999). Modeliuvannia z vykorystanniam statystychnykh baz danykh pry stvorenni monitorynhovykh system. *Statystyka Ukrainy*, *3*(6), 54-59.
18. Pokhylko, A. F. & Horbachev, Y. V. (2008). CASE-tekhnolohyia modelyrovanyia protsessov s yspolzovanyem sredstv BPWin y ERWin uchebnoe posobye, Ulianovsk: UlHTU.
19. Prohramnyi kompleks «Universal (2017). Kompaniia «SoftPro» m. Kharkiv, Available: https://www.wgsoftpro.com/2017/comparison.html.
20. Stetsenko, S. P., Tytok, V. V., Emelianova, O. M., Bielienkova, O. Y., & Tsyfra, T. Y. (2020). Management of adaptation of organizational and economic mechanisms of construction to increasing impact of digital technologies on the national economy. *Journal of Reviews on Global Economics*, *9*, 149-164.
21. Stetsenko, S.P., Tytok, V.V., Emelianova, O.M., Bielienkova, O.Yu & Tsyfra, T.Yu. (2021). The interrelation of digital technologies and organizational and economic mechanisms in construction: adaptation to change management. *International Review*, *1*, 21-31.
22. Tugai, O. A., Hryhorovskyi, P. Y., Khyzhniak, V. O., Stetsenko, S. P., Bielienkova, O. Y., Molodid, O. S., & Chernyshev, D. O. (2019). Organizational and technological, economic quality control aspects in the construction industry: collective monograph. *Lviv-Toruń: Liha-Pres*.
23. Rahman, S., Perera, S., Odeyinka, H., & Bi, Y. (2008, September). A conceptual knowledge-based cost model for optimizing the selection of materials and technology for building design. In *Proceedings of the 24th Annual ARCOM Conference* (Vol. 1, pp. 217-226).
24. Yu, W. D., Wang, K. W., & Wang, M. T. (2013). Pricing strategy for best value tender. *Journal of construction engineering and management*, *139*(6), 675-684. http://dx.doi.org/10.1061/(ASCE)CO.1943-7862.0000635.
25. Elazouni, A. (2009). Heuristic method for multi-project finance-based scheduling. *Construction Management and Economics*, *27*(2), 199-211.
26. Kuchansky, A., Biloshchytskyi, A., Andrashko, Yu., Biloshchytska, S., Shabala, Ye., & Myronov, O. (2018). Development of adaptive combined models for predicting time series based on similarity identification. *Eastern-European Journal of Enterprise Technologies*, *1*(4(91)), 32-42, 2018. doi: 10.15587/1729-4061.2018.121620

Scientific Journal of Astana IT University
ISSN (P): 2707-9031
ISSN (E): 2707-904X

27. Bielienkova, O. (2020). FACTOR ANALYSIS OF PROFITABILITY (LOSSES) CONSTRUCTION ENTERPRISES IN 1999-2019. *Economics, Finance and Management Review*, (1), 4-16. doi: 10.36690/2674-5208-2020-1-4
28. Ryzhakov, D., Dikiy, O., Druzhynin, M., Petrenko, H., & Savchuk, T. (2020). Innovative tools for management the lifecycle of strategic objectives of the enterprise-stakeholder in construction. *International Journal on Emerging Trends in Engineering Research*, *8*(8), 4526-4532. https://doi.org/10.30534/ijeter/2020/78882020
29. Izmailova, K., & Zapiechna, Y. (2020). STUDY OF UNPROFITABILITY OF UKRAINE'S LARGE CONSTRUCTION ENTERPRISES BY THE DUPONT METHOD. *Three Seas Economic Journal*, *1*(4), 84-89. https://doi.org/10.30525/2661-5150/2020-4-12
30. Bielienkova, O.Iu. (2020) Stratehiia ta mekhanizmy zabezpechennia konkurentospromozhnosti budivelnykh pidpryiemstv na osnovi modeli staloho rozvytku: monohrafiia. Kyiv: Lira-K.
31. Stetsenko, S. P. (2017). Vplyv sezonnykh kolyvan na vartisni parametry budivelnoho vyrobnytstva [The influence of seasonal fluctuations on the cost parameters of construction production]. *Upravlinnia rozvytkom skladnykh system*, (32), 179-185.
32. Semenova, Yu. A., & Petreneva O. V. (2011). Comparative analysis of the pricing system in construction in Russia and foreign countries. *Bulletin of the Perm National Research Polytechnic University: construction and architecture*, *1*, 75-80.