

COMPETITIVE ADVANTAGES OF THE OPEN MARKET FOR METRO CONSTRUCTION

Metro systems of many bigger cities worldwide are being extended in the beginning of the 21st century. The construction of new systems and extension of existing ones aims to shorten the time it takes to travel and to unload cities from excess road transport. This is an important benefit for the growing urban population. The metro projects contribute to providing passengers with easier access to different parts of the cities to reach the crucial places of the city lifestyle, such as work places, education hubs and medcare institutions.

At the same time, it should reduce congestion on the roads, making travel easier for drivers. That is also important for city ecology as it reduces air emissions from cars and noise level.

In this study we analyzed the cost of metro construction in different cities of Europe and Asia. We observed 14 metro systems that were built in 2019-2021 or the construction of which is still ongoing. Geography covers the cities of Western Europe (Vienna), Central and Eastern Europe (Warsaw, Bucharest), Eastern Europe (Minsk, Dnipro, Moscow), the Middle East (Doha, Dubai), South Asia (Lahore, Dhaka), Southeast Asia (Jakarta, Ho Chi Minh City). We will calculate the average cost per kilometer by dividing the cost of the entire project by the number of kilometers. Thus, this figure includes the cost of building tunnels, tracks, stations and depots. All prices will be quoted in US dollars.

The cheapest project is the construction of a metro in Lahore (Pakistan). There, a system with a length of 27,1 km is being built from scratch, which will include 26 stations. The total cost of the project is \$1600 mln. This gives an average cost of \$59 mln per kilometer. The project is being built by local construction companies Maqbool Calson JV (Pakistan) and ZKB Reliable JV (Pakistan). In Hanoi, the cost of construction is similar – \$66 mln. But here construction is being carried out by a foreign contractor – China Railway Sixth Group (China). The construction of the North-South Line in Jakarta costs about the same – \$69 mln. Construction here is carried out by Japanese companies and Japanese-Indonesian jointed companies.

In Warsaw and Vienna [9], the construction of modern metro systems costs \$77-83 mln. The construction is done by some of the most experienced European companies – Porr (Austria), Strabag (Austria), Astaldi (Italy), as well as a Turkish company Gulermak, which has been active in the EU market lately. All projects are awarded via an open tender, in whom any company in the world can participate, and the winner is determined

based on their proposition. In 2020, four stations of the Third metro line were opened in Minsk. With a total length of 3,5 km, the costs amounted to \$85 mln per km [1]. The work was carried out by the Belarusian company Minskmetrostroy (MMS). The company was founded in 1977 deliberately for the construction of a metro in the city, and in fact is a natural monopolist – the city gives the company any metro construction in Minsk.

In Doha, the metro system was built from scratch in 2015-2020. Altogether, three new lines with a total length of 76 km were built. The latest technologies of both construction and the functioning of the metro are used here – all trains are unmanned. Experienced companies from Europe, Turkey and South Korea were involved in the construction. The cost of a kilometer of metro was \$108 mln [10]. In 2021, a project of a similar size was inaugurated in Moscow – 61 km of the Bolshaya Koltsevaya Line. Such a large project in the shortest possible time could not have been built by one company – 19 companies participated in the construction. Most of them are Russian, but there are also foreign ones: CRCC-RUS (China), MMS (Belarus), Evraskon (Azerbaijan). The construction cost here is similar to Doha – \$109 mln [2].

The construction of the metro in Ho Chi Minh City (Vietnam) and Dhaka (Bangladesh) is even more expensive – \$126 mln [7] and \$139 mln, respectively. Perhaps, the features of dense buildings and the need to demolish them under the metro play a role here. Interestingly, Hoshimin Metro Line was originally expected to cost \$1,1 bn (or \$55 mln for 1 km), but costs have now risen to around \$2,5 bn [8]. Another interesting example is the city of Dnipro in Ukraine. Here, for the first time since 1995, the city decided to extend the system with 3 new metro stations thus adding 2,4 km to the existing line. The construction is carried out by the Turkish company Limak. On this project, the high cost is due to the short length of the line – \$141 mln.

And finally, the most expensive metro was Expolink in Dubai. The line was constructed for the opening of EXPO-2020. The construction was carried out by a Spanish-Turkish-French joint venture. The cost of a kilometer was \$194 ml [5]. The system uses the most modern technologies in the construction of the metro and is unmanned. As we can see, the construction of a kilometer of the metro system costs \$59-194 mln and averages \$110 mln. The most popular awarding method in countries with open market economies is tendering and further construction of the metro by foreign companies or joint ventures. The most competitive in the international market are companies from EU (Austria, Spain, Italy), Turkey and China.

Taking into consideration the above, a potentially winning strategy for MMS can be access to foreign markets through participation in tenders. Perhaps in partnership with Russian or European companies. Potential

markets could be the markets of Russia, the EU, the Middle East, Southeast Asia, where there is a high demand for this type of construction services.

On the other hand, the possibility of an open tender for the construction of the Minsk metro seems logical. Thus, the city will be able to receive the best competitive offer, the introduction of the most modern technologies. The experience of Warsaw and Vienna shows that tender construction may be of the same cost (or possibly even cheaper) than the present cost of construction done by MMS in Minsk now. In tender construction, the construction budget is fixed, which allows it to be kept within the originally agreed framework and not to be exceeded during construction. It also allows you to carry out the project within the time frame strictly allotted for this (we can recall the numerous postponements of the delivery date of the third line of the Minsk metro). In addition, this relieves the city of the need to maintain the functioning of the MMS enterprise during the period when the city is not building a metro.

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ДИВЕРСИФИКАЦИЯ РЫНКОВ СБЫТА В УСЛОВИЯХ ЦИФРОВИЗАЦИИ

Современное состояние и происходящие изменения в традиционных производственных отраслях и отраслях услуг, изменение структуры потребления под влиянием внедрения информационных