Markina Yelyzaveta

Bachelor's degree program student, 4th year, NaUKMA

ECONOMIC PREREQUISITES FOR THE APPLICATION OF THE GREEN LEAN SIX SIGMA APPROACH IN UKRAINE

Introduction And Literature Review. In the modern world, the demand for production optimization is rising. Due to the rapid development of artificial intelligence (AI) and large language model (LLM) technologies, the business demand for developing and optimizing business processes is high. Not only huge, well-known corporations but also small and medium businesses all around the world are eager to implement new technologies and benefit from the enhancement they are about to make.

Ukraine's striving for improvement and keeping up with modern business trends is stable and increasing. Optimization can be seen in various fields. For instance, particular cases of renewable energy management in Ukraine (in particular, the hybrid energy system in the Zaporizhzhia region) show the usage of decision-making algorithms that address operational inefficiencies [1]. The two approaches studied in the research of Siasiev A., Dudnikov S., Nikolaienko D., Hubal O., and Bondarchuk O. show the reduction of prediction error by approximately 54% and rapid increases in energy loss reduction, operational cost reduction, as well as frequency fluctuation reduction by 56%, 18%, and 67%, respectively [1]. Also, the case study of the optimization processes of IT companies in Ukraine ultimately suggests the general system of optimization of the business processes for IT companies based on the comprehensive study of the existing business processes themselves [2]. There are many more examples of optimization variants for the enterprises of different areas, although generally, we may group the methods of streamlining into three main clusters: 1) the ones based on the experience; 2) the ones based on the benchmarking; 3)the ones based on the team-work technologies [3].

This work is going to be focused on a particular method of optimizing processes that can be partially attributed to the third cluster from above. Sereda S. O. states that the approaches from this cluster are based on the unification of the personnel in order to achieve some improvements and enhance the processes in a team-working manner [3].

The Green Lean Six Sigma (GLSS) method that is going to be discussed below is a precise project-based method that aims at eliminating possible waste (either it is the time costs, the labour or the actual pollution). By and large, the GLSS approach is the work of the trained team in cooperation with the employees of all levels with the goal to reduce the defects per million opportunities to only 3.4 ideally.

Problem Statement. In Ukraine, due to the full-scale war that russia started in 2022, a number of problems have appeared, i.e., the amount of environmental pollution has risen, there is a shortage of labour force, the risks for businesses have increased etc. For Ukrainian enterprises to survive, they should optimize their business and workflow to meet all the challenges of the time. The GLSS method has proven efficient for companies abroad, it is based on management studies and framework, therefore the implementation of it (of course, with adjustments for every particular case) may be a good option for businesses to overcome problems and collect the benefits in the future.

Main Material. The combined GLSS approach has taken the best practices of the *Green* environmental frameworks of reducing the production waste and of the *Lean Six Sigma* framework that would not normally include environmental sustainability practices on its own but is indeed a great and trustworthy method of optimizing the production and business processes based on the statistics and other enhancement patterns.

Besides optimizing the level of waste and losses, the method also touches on the question of the quality of the produced goods and services, which ensures the producer of the comprehensive result of the streamlining of the manufacturing.

Although the method is traditionally used as a way to improve production and the processes of manufacture, there are also examples and case studies of the

implementation of such methodology for financial processes. For example, in the case study of the application of Six Sigma in finance, the authors conclude that "a significant reduction in cycle time was achieved for producing the FP&A reports; specifically, the revised process resulted in 100 hours reduction in cycle time, resulting in cost savings of $130,000 per year or roughly a 64 percent reduction" [4]. Therefore, not only big producers but also small and medium businesses could potentially benefit from the implementation of the customized techniques of the GLSS method.

Let us look at the economic and societal prerequisites for the execution of the GLSS methodology in Ukraine. Firstly, all the new environmental challenges of the war notwithstanding, the amount of waste in Ukraine, even before the russian invasion in 2020 (the data on the waste in Ukraine after the year 2020 has not been published yet, so the comparison with the EU data is made of the same year), was high. In the chart below, we can clearly see that the waste level in Ukraine is significantly higher than most of the other represented countries' levels (Fig. 1).

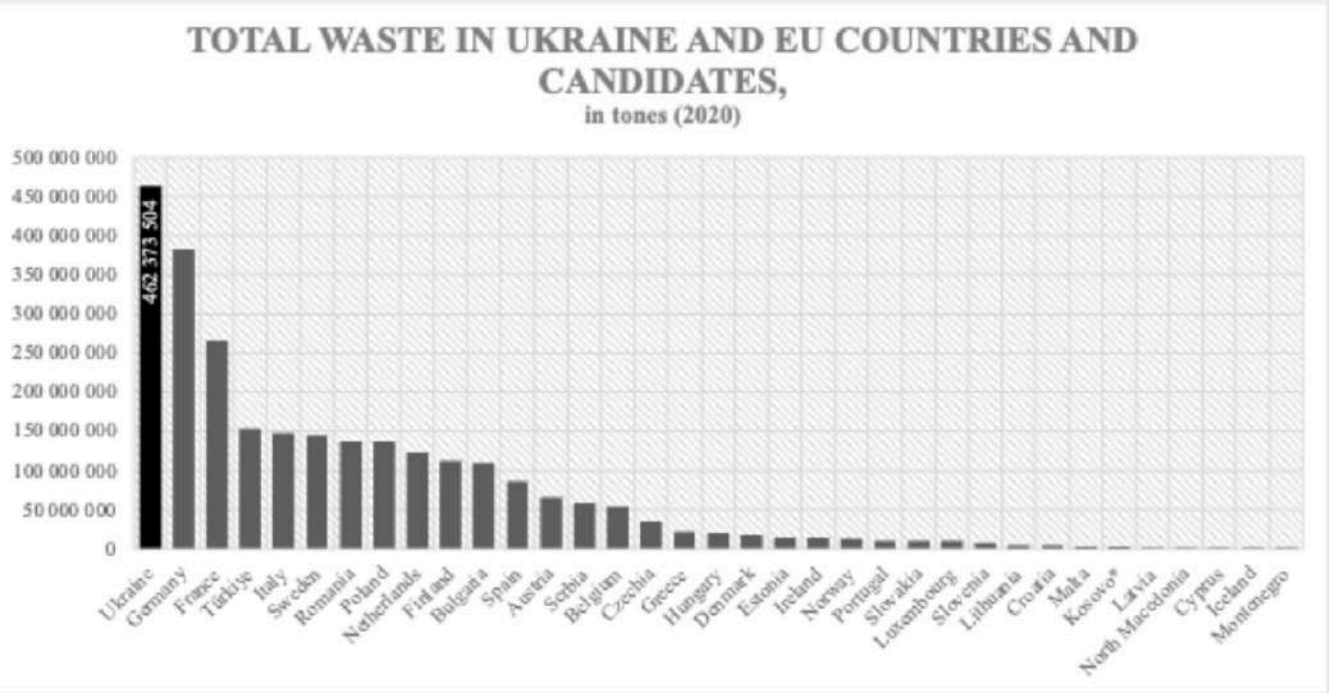

Figure 1. The amount of total waste in 2020 in Ukraine and EU countries and candidates, in tones

Source: author's work based on the data from 5, 6

Secondly, labour loss is another problem to be faced. It is also connected to cost-saving processes. Let us have a look at the expectations of businesses of different orientations (manufacturing, construction, retail, and services) throughout the year collected by the National Bank of Ukraine (NBU) (Fig. 2) [7]. The graph below shows that throughout the years among the surveyed businesses, there are more proponents (46% in February 2025) of the idea that the prices of supplies for the businesses are going to increase and more expectations (13.3% in February 2025) for the number of employees to go down. The expectation of prices of suppliers are calculated as the average of prices for raw materials for production, purchase prices (vendor prices) and cost of contractor services for construction, cost of goods purchased for sale for retail, and purchase prices (vendor prices) for services. Although the majority in both indicators sides with more neutral expectations of the absence of any changes, the overall tendency may be useful to describe the economic prerequisites for the implication of the GLSS practices among Ukrainian businesses.

When companies have a decreasing number of employees, there is likely to be a problem of not enough performers for all the processes of the business flow. This may lead both to inefficiency of the processes and the burn-out of the workers, which is also important to take into consideration. Ultimately, it may result in higher costs for labour for the company. Combing this issue with the suppliers' prices rise, the cost of the processes is accelerating due to all the production costs increase. If the implementation of the suggested method happens, there is a great chance that the problem of efficiency reduction due to the issues mentioned above is about to be solved via tools of analysis and optimization offered by the GLSS process.

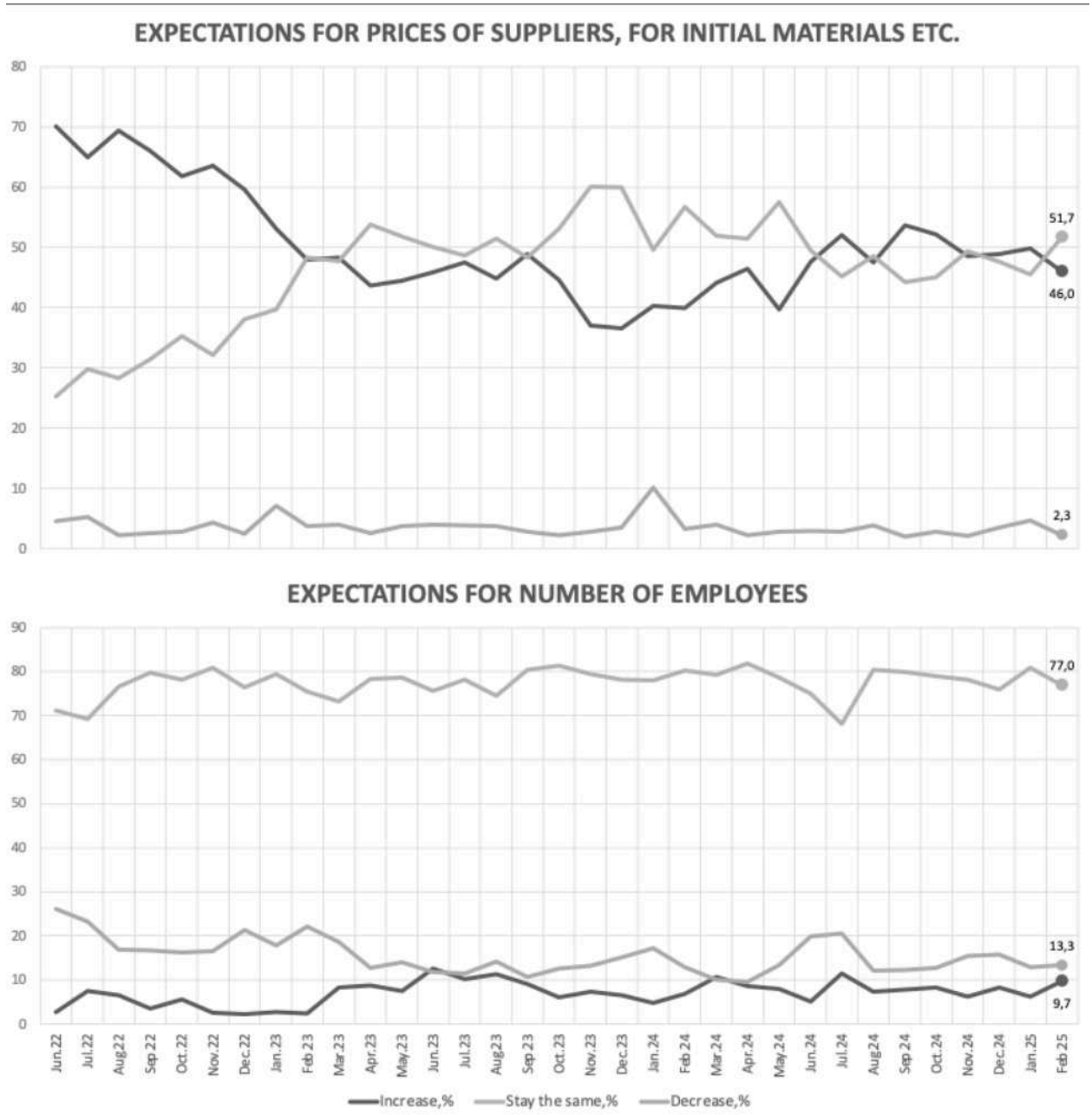

Figure 2. The surveyed expectations of Ukrainian businesses on prices of supplements and the number of employees during June 2022 and February 2025, in %

Source: author's work based on the data from 7

Conclusions. To conclude, the GLSS is an effective method of optimization of the processes on different levels of production of either goods or services. It is widely used among big corporations abroad and has proven its efficiency along the way. In Ukraine, the techniques suggested in this method are about to be relevant not only for the same reasons of profit benefits possibilities as for abroad colleagues but also for the reduction

of the consequences of the war such as higher environmental pollution, the shortage of the workforce and the increase in prices of vendors and suppliers of goods, materials and services. Ukrainian businesses of different areas should pay closer attention to the GLSS method and its separate tools.

References:

1. Siasiev, A., Dudnikov, S., Nikolaienko, D., Hubal, H., & Bondarchuk, O. (2025). Evaluation of the effectiveness of decision-making algorithms in the management of renewable energy sources: A case study of Ukraine. Sustainable Engineering and Innovation, 7(1), 87–96. https://doi.org/10.37868/sei.v7i1.id415
2. Serhiienko, O., Mashchenko, M., Samorodov, B., Babichev, A., & Klimenko, O. (2024). Simulation and Optimisation of Business Process Management: Case Study of IT Company. Business Systems Research Journal, 15(1), 67–90. https://doi.org/10.2478/bsrj-2024-0004
3. Середа, С. О. (2025). Оптимізація управлінської діяльності для малого та середнього бізнесу: підходи та інструменти. Zenodo. https://doi.org/10.5281/zenodo.14716939
4. Ansari, A., Lockwood, D., Thies, E., Modarress, B., & Nino, J. (2010). Application of Six-Sigma in finance: a case study. Journal of Case Research in Business and Economics. https://www.semanticscholar.org/paper/Application-of-Six-Sigma-in-finance-:-a-case-study-Ansari-Lockwood/682f42aa4f8bf26daf74207c5378599d99e98b6e
5. Treatment of waste by waste category, hazardousness and waste management operations. (2020). Eurostat. https://ec.europa.eu/eurostat/databrowser/view/env_wastrt/default/table?lang=en
6. Утворення відходів за класифікаційними угрупованнями державного класифікатора відходів. (2020). Держстат України. https://www.ukrstat.gov.ua/
7. National Bank of Ukraine. (2024). Monthly Business Outlook Survey, October 2024. https://bank.gov.ua/en/news/all/schomisyachni-opituvannya-pidpriyemstv-ukrayini-jovten-2024-roku