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# «Metrological Support of Innovative Technologies» ICMSIT-2020

«Algorithm of materials processing optimization in accordance to metrological requirements of quality management system»

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**ICMSIT-2020**  
Metrological Support  
of Innovative Technologies

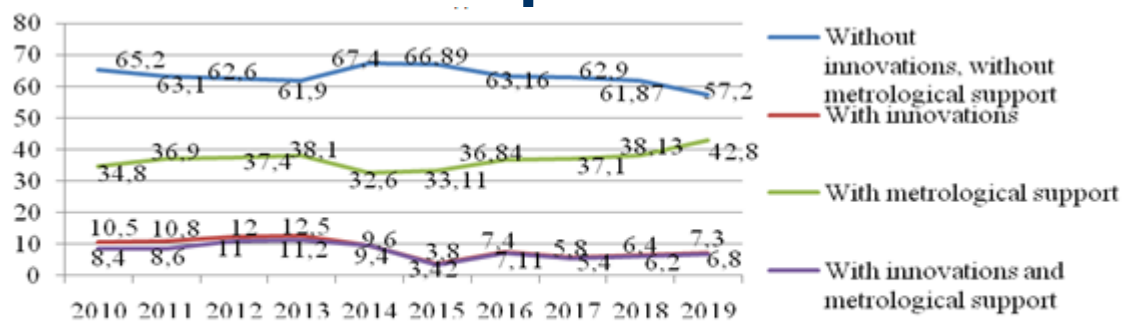
# Problem statement

Business entities activities are impossible without innovative technologies applying at the present stage of economic development. This applies materials modeling and processing as well as economic and managerial operations. One of the management main tenets is that one can control resources, technologies and activities if they can be objectively measured. Such metrics and means of measurement are provided by metrology methodology. If earlier metrological approaches were considered in the narrow sense referring only to physical processes, now its effect is extended to all quality assurance processes, and also is reflected in international standards requirements, regulations and committees functioning.

Metrology is the science of measurements, methods and means of ensuring their unity and methods of achieving the required accuracy. The subject of metrology is the extraction of quantitative information about the properties of objects with a given accuracy and reliability [8]. Evidently nowadays metrological requirements compliance is very important for modern economic units. It is in the basics of any quality system that provides competitiveness and economic security achievement to any business. And if there are a sufficient number of metrology theory publications [8-16], then the question of metrological requirements of quality management system applying to materials processing optimization requires additional research. This determined the research aim that is to determine possible algorithm of materials processing optimization in accordance to metrological requirements of quality management system.

# Solution methods

There were applied general scientific and special research methods to find the solution for mentioned aim of this article, and they included process, system and metrological approaches, technical and economic, structural, statistic and content types of analysis, experts' estimation, quality management system standards requirements.

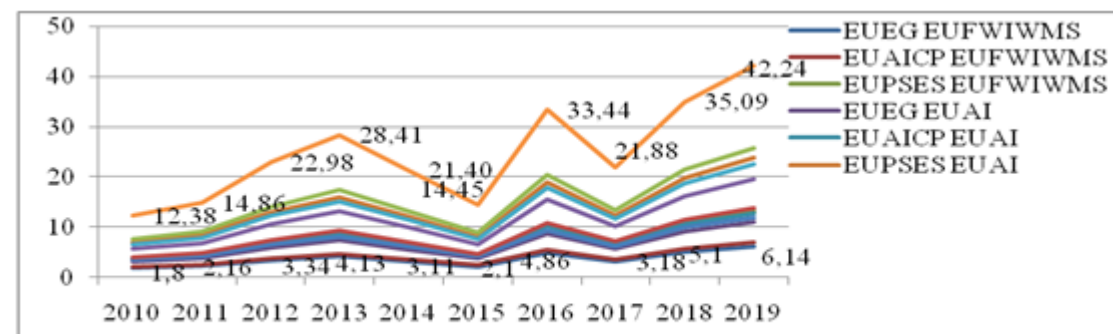


**Figure 1.** The graphical interpretation of innovations and metrological support applying by SFD budget-forming economic units (2010–2019 years) (%)

**Table 1.** Evaluation of EUEG, EUAICP and EUPSES (%) (author's researches, experts' estimation)

Year	EUEG EUFWIWMS	EUAICP EUFWIWMS	EUPSES EUFWIWMS	EUEG EUAI	EUAICP EUAI	EUPSES EUAI	EUEG EUMSA	EUAICP EUMSA	EUPSES EUMSA	EUEG EUMSA	EUAICP EUMSA	EUPSES EUMSA
2010	1,8	2,07	3,87	3,24	3,73	6,97	3,51	4,04	7,55	5,76	6,62	12,38
2011	2,16	2,48	4,64	3,89	4,47	8,36	4,21	4,84	9,06	6,91	7,95	14,86
2012	3,34	3,84	7,18	6,01	6,91	12,93	6,51	7,49	14,00	10,69	12,29	22,98
2013	4,13	4,75	8,88	7,43	8,55	15,98	8,05	9,26	17,32	13,22	15,20	28,41
2014	3,11	3,58	6,69	5,60	6,44	12,04	6,06	6,97	13,04	9,95	11,44	21,40
2015	2,1	2,42	4,52	3,78	4,35	8,13	4,10	4,71	8,80	6,72	7,73	14,45
2016	4,86	5,59	10,45	8,75	10,06	18,81	9,48	10,90	20,38	15,55	17,88	33,44
2017	3,18	3,66	6,84	5,72	6,58	12,31	6,20	7,13	13,33	10,18	11,70	21,88
2018	5,1	5,87	10,97	9,18	10,56	19,74	9,95	11,44	21,38	16,32	18,77	35,09
2019	6,14	7,06	13,20	11,05	12,71	23,76	11,97	13,77	25,74	19,65	22,60	42,24

There was made graphical interpretation (figure 2) based on the data from the table 1.



**Figure 2.** Evaluation of economic units' efficiency growth, their ability to increase competitive potential and strengthen economic security (2010–2019 years) (%) (on data from table 1)

# Conclusions

## Results, implementation

Suggested materials processing optimization algorithm according to the quality management system requirements for stochastic conditions allows realize it optimally, and adapt entity to functioning in accordance to international standards and metrology requirements and modern business realities. Also materials processing economic units will receive with this algorithm not only operational processes optimization but also management and supporting ones as a whole. It give competitive potential grows base and stability in modern economy.

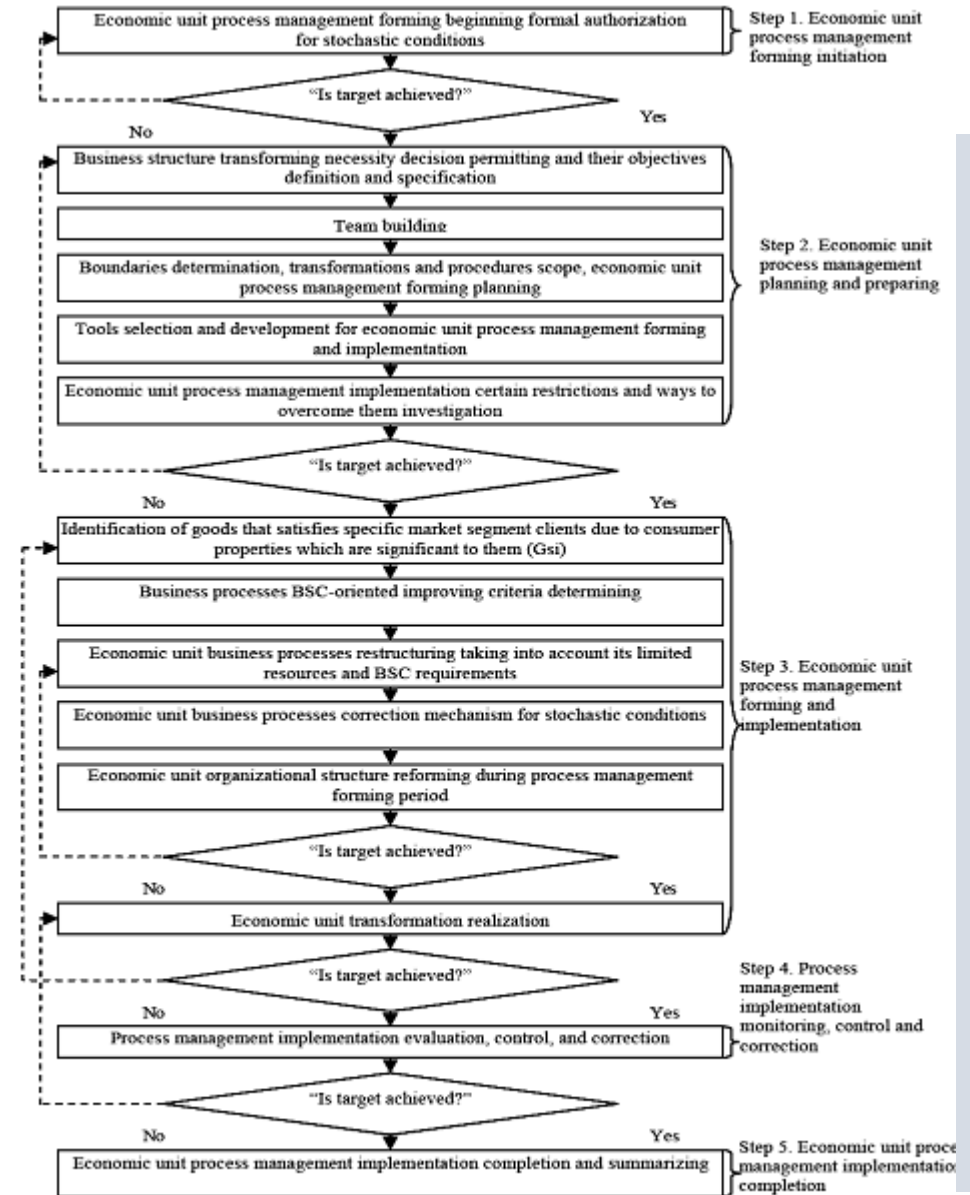


Figure 3. Materials processing optimization algorithm according to the quality management system requirements (author's research)

# Contacts

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