RPTSS 2018
International Conference on Research Paradigms Transformation in Social Sciences

METHODOLOGICAL APPROACH TO ASSESSING RESOURCE POTENTIAL OF PRODUCTION SYSTEM

E.A. Ilina (a)*, M.V. Velm (b)
*Corresponding author

(a) Irkutsk State Agrarian University named after A.A. Ezhevsky, Apt. 44, 3, Molodezhny village, Irkutsk region, Russia, ielena1771@bk.ru, 89501001771
(b) Irkutsk State Agrarian University named after A.A. Ezhevsky, Apt. 10, 72g, Zhukov Avenue, Irkutsk, Russia, mvelm@yandex.ru, 89086611066

Abstract

Economic development is impossible without meeting constantly growing demands of society as it is necessary to create efficient production systems of different levels. So the level of enterprises implies the solutions to tasks of producing goods or services with limited resources, at the level of regional or federal authorities development of goods or services production with limited resources must be stimulated. In other words, the question is production systems of different levels that have limited resources (raw material, labour, legal, technological, information, material and technical, economic resources). The degree of efficiency of using them to achieve some economic effect characterizes the resource potential of the production system. It should be noted that components of the resource potential of the production system are characterized by different dimensions (qualitative and quantitate), that is why for the assessment of this potential, the methodological approach is proposed; it is based on the fuzzy-set theory and it is applied using the software product *MatLab*. The given methodological approach was tested based on the resource potential of the system of procuring food resources of forests in the Irkutsk region. To get the quantitative assessment of every component of the procurement system of the region, personal assessments of analytical experts were used. This assessment allowed making the conclusion about the influence of every component on the resource potential of the system of procuring the food resources of forests, defining the "target" zones and proposing ways of development.

Keywords: Resource potential, fuzzy-set theory.

1. Introduction

With the development of the society, the needs are increasing and changing; it relates to their quantity, quality and a structure. It is reflected in the law of increased demands. The growth of demands quantity and their changes creates a compulsory incentive for producing goods via developing production systems.

A production system is a special system which consists of means of production, products, production processes and labour force; their joint functioning allows creating goods or rendering services. Depending on the size, one defines the production systems of the company and of the industry (at the regional or federal levels) (Tyapkina, Ilina, & Ilyashevich, 2017).

It should be noted that the development of the given system is impossible without having and using different resources: raw material, labour, technological, information, material and technical, economic. In this context it makes sense to assess the condition and usage of the resource potential of the production system properly in order to manage and develop the production at different levels (enterprise, industry) efficiently.

2. Problem Statement

The usage of different methodologies of assessing the resource potential of the production system involves different methods of analysis: expert polls, rating assessment, multi-factor regression model, and the result of these models is elaboration of the integral indicator. The differences in the results obtained are caused by the degree of adequacy of the assessment model itself and of the factors involved in assessment.

When selecting the factors for the assessment of the resource potential of the production system, the scientists often choose only quantitative factors, as it is easier to assess them and to build a mathematical model of assessment. Given that not all the components of the resource potential of the production system are included in the assessment model, it is not correct to claim that the assessment methodology can characterize the level of the resource potential in full.

If the qualitative factors are also included in the model, the most common way of processing them is expert polls taken via questionnaire surveys. This method has significant drawbacks: the comparison of the great number of the production systems is labour-intensive; if an expert has to compare the production systems of different regions in one country, he/she may not have the access to the information; definite obstacles may appear when comparing the resource potential of the own production system (enterprise), as well as defining its dynamics and "hotspots" in order to correct them.

3. Research Questions

The issues of the assessment of the resource potential of the production systems of different levels were studied by Mashenene and Rumanyika (2014), Ylimaki (2006), Anastase (2013), Rashchupkina and Kozlova (2016), Noskova and Romanova (2015), Bessonova and Mereshchenko (2017). Despite the significant number of the scientific works, there is no single approach to the assessment of the resource potential of the production systems.

4. Purpose of the Study

Thus, currently, there is no methodological approach to the assessment of the resource potential of the production system which implies: defining and assessing the separate components (resources) of the production system and their constituents; reducing them to a single dimension and calculation of the integral indicator which allows receiving the quantitative assessment of the condition and usage of the resource potential of the entire production system. In this context the purpose of the study is to develop the methodological approach that is based on the fuzzy-set theory.

5. Research Methods

The algorithm of implementing the methodological approach to the assessment of the resource potential of the production system can be presented in the form of sequential going through the following stages.

At the first stage, to assess the condition and usage of the resource potential of the production system, it is necessary to define the components and their constituents and then after the analysis one can get the information about the condition and usage of each of them and plan the development of the entire system.

It should be mentioned that in the production system resources are usually understood as an assembly of different elements that influence the functioning of the system directly or indirectly. That is why the basic components of the production system are raw material, legal, material and technical, labour, technological, information and economic ones, and the resource potential of the production system is an assembly of interrelated and interdependent components of the system (Silich, 2016).

At the second stage, it is necessary to establish a hierarchy of the components of the resource potential of the production system. In the authors' opinion, the "top" of the hierarchy (the 1st level) is presented by such components as raw material and labour, the "bottom" (the 3rd level) – by material-technical and economic components, whereas legal, technological and information components form a linker (the 2nd level) (Fig. 01).
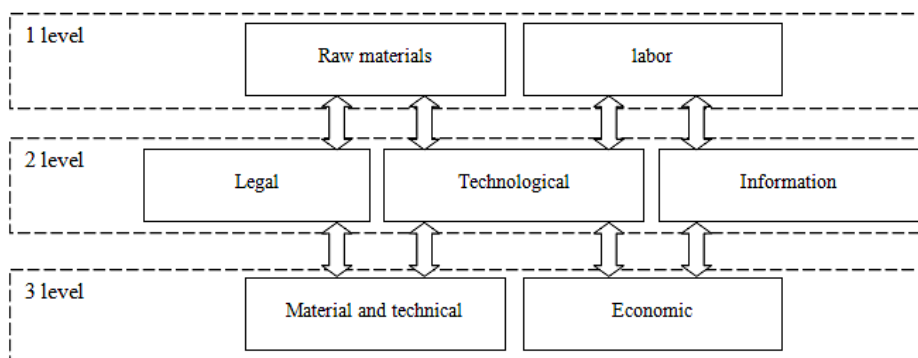

Figure 01.   Components of the resource potential of the production system

Such hierarchy of components is conditioned by the fact that the "top" (namely, raw material and labour components) is the basis for the enterprises' economy development. Without definite supplies and qualified workers, it is impossible to develop the production. The legal, technological and information

components perform the interrelation and implementation of the upper and lower components of the resource potential of the production system in full (Andreeva & Nechaev, 2013; Nechaev, Antipin, & Antipina, 2014a; Nechaev, Antipina, & Prokopyeva, 2014b).

The hierarchy of the components of the production system conditions the procedure of the selection of indicators characterizing each of them and the procedure of their assessment (Table 01).

Having defined the basic components and created their hierarchy, it is possible to present the resource potential of the production system as a function, the arguments of which are all the above-mentioned components:

$$RP= f(K1,K2,K3,K4,K5,K6,K7) \qquad (1)$$

where RP is the resource potential of the production system; K1 – raw material resource; K2 – labour resource; K3 – legal resource; K4 – technological resource; K5 – information resource; K6 – material and technical resource; K7 – economic resource.

Table 01. Components and their constituents in the assessment of condition and efficient usage of the resource potential of the production system

Component (resource)	Constituents
Raw material	– sufficient quantity of raw materials that can be used in the production process.
Labour	– work experience in the procurement system; – average monthly wages; – proportion of workers having specialized education.
Legal	– quantity of the available legal-regulatory documents; – quantity of the newly-approved legal-regulatory documents for more efficient production activity; – diversity of the legal forms of the organizations performing the production activity.
Technological	– provision of the enterprises with the modern technologies of production; – provision of the enterprises with the modern technologies of processing the products; – provision of the enterprises with the modern technologies of the products storage; – provision of the enterprises with the modern technologies of the products transportation.
Information	– availability of the information services; – availability of the scientific researches in the sphere of the goods production; – the quantity of the organizations training the skilled workers; – availability of the statistical information about the production sphere.
Material and technical	– the level of the company's provision with the necessary equipment for producing and processing the goods; – the level of the company's provision with the necessary equipment for the storage and transportation of the goods; – the level of expenses for the equipment maintenance; – the level of expenses for the vehicle maintenance.
Economic	– the total cost of the production; – the total cost of processing the products; – the total cost of the transportation of the products; – the share of cash receipts from selling the products; – the share of the profitable enterprises.

The domain of this function is fuzzy subsets established at the ground set: low – [0-4], medium – [4-7], high – [7-10]; and the function of membership of the given linguistic variable is presented by Mamdani's model.

At the third stage, the personal opinions of the analytical experts are used for defining the degree of the indicators characterizing each component according to scale 1-10. The higher the membership degree is, the more the element of the ground set is consistent with the features of the fuzzy set. After that, the aggregation of the personal expert assessments in the collective expert assessment is made beginning from the smallest value and finishing with the biggest one. Then the integral (omnibus) indicator for the entire component is calculated on the grounds of "max" procedure. The integration of assessments is performed according to the consensual choice rule, that is, the value of the constituent (x) is chosen at the point that proves the highest authenticity of its membership in the definite fuzzy subset (Levin, 2001; Poludova, 2016).

For example, one expert assessed the constituent of the analyzed component as 3-4, another expert – as 4-5, and the other one – as 5-6, consequently, the assessment of this component is in the range of 3-6. The abscissa of the top of the membership function corresponds to the maximum value of the ordinate, thus, this parameter of the analyzed component belongs to the definite subset with the greatest degree of reliance. This procedure is used for all the constituents of the production system components.

The development of the computer expert system that will draw the systemized conclusion about the condition and usage of the resource potential of the production system is the final stage of the methodology of the resource potential assessment.

To develop this expert system, it is necessary to set up the production rules of the fuzzy inference (Table 02).

Table 02. Production rules of the fuzzy inference for the development of the expert system

Rule	Reasoning
Rule 1: if K1 is high, K2 – high, K3 – high, K4 – high, K5 – medium, K6 – medium, K7 – medium then RP is high	When having available raw materials for the production, high degree of the development of labour, legal and technological components, it is possible to use the material and technical base as well as financial resources efficiently
Rule 2: if K1 is high, K2 – medium, K3 – high, K4 – high, K5 – medium, K6 – medium, K7 – high then RP is high	High raw material potential, developed legal and technological bases, significant volume of the available financial resources allow using the labour and material-technical components to the maximum
Rule 3: if K1 is high, K2 – medium, K3 – medium, K4 – high, K5 – high, K6 – high, K7 – medium then RP is high	High information and material-technical resources create the sufficient base for training and it allows using the labour resources more efficiently
Rule 4: if K1 is medium, K2 – medium, K3 – low, K4 – medium, K5 – medium, K6 – medium, K7 – medium then RP is medium	A medium degree of development of the majority of resources conditions the medium degree of the entire resource potential development
Rule 5: if K1 is high, K2 – high, K3 – low, K4 – medium, K5 – low, K6 – medium, K7 – medium then RP is medium	High raw material and labour resources together with undeveloped legal base create prerequisites both for increase and decrease of the entire resource potential of the production system

Rule 6: if K1 is high, K2 – low, K3 – medium, K4 – medium, K5 – low, K6 – medium, K7 – medium then RP is low	A high level of raw material resource cannot lead to the desirable result without developed labour component
Rule 7: if K1 is high, K2 – medium, K3 – medium, K4 – medium, K5 – medium, K6 – medium, K7 – medium then RP is medium	A high level of raw material resource and medium level of the other components maintain the medium level of the resource potential development
Rule 8: if K1 is high, K2 – low, K3 – medium, K4 – low, K5 – low, K6 – low, K7 – low then RP is low	Lack of information, financial and material-technical resources causes the producers' disinterest in the labour results as well as loss of the qualified workers
Rule 9: if K1 is high, K2 – medium, K3 – low, K4 – low, K5 – low, K6 – low, K7 – low then RP is low	A high level of raw material resource creates prerequisites for the production growth, but low level of development of the basic resources significantly lessens the possibility of implementing the strategies of modernization and development
Rule 10: if K1 is low, K2 – high, K3 – medium, K4 – medium, K5 – medium, K6 – medium, K7 – medium then RP is low	A low level of raw material resource even if the level of labour resource is high and the level of the other components is medium cannot lead to positive effect

The assessment of the resource potential of the production system will allow analyzing the condition of all the components of the given system. The algorithm of the assessment of the resource potential of the production system is applied with the help of the package *Fuzzy Logic Toolbox* of the software product *MatLab.*

6. Findings

To implement the measures of the sub-program "Development of Agriculture and Regulation of Markets of Agricultural Products, Raw Materials and Food in the Irkutsk region" for 2014-2020 approved by the Irkutsk region government decree № 568-pp of 9 December 2013 concerns the development of the sphere of procuring and processing the wild crop resources of the Irkutsk region. The assessment of the resource potential of the system of procuring the food resources of forests was performed on the basis of the given methodological approach and it allowed defining the condition of every component of the system.

To get the quantitative assessment of the constituents of every component of the system (Kostylev, 2010) of the regional procurement the personal assessments of the analytical experts were used. The workers of the procurement organizations, the Forestry Agency and municipal authorities of taiga areas of the region took part in the survey as analytical experts. Applying the intuitive-logical analysis of all the constituents of the components on the basis of the utility function with the use of a 0-10 scale these experts assessed the condition and efficiency of using the resource potential of the system of procuring the food resources of regional forests. The results of the final interval fuzzy assessment of each component of the resource potential were presented by the personal judgements of the analytical experts integrated in one collective assessment from the smallest to the largest values.

The raw material component was assessed rather high – 9. This proves that the Irkutsk region has a significant volume of the food resources of forests.

According to the experts' assessment, the labour component was assessed as 4-7. The integral assessment of the constituents of the given component has a fuzzy "medium" value (Table 03).

Table 03. Assessment of the labour component of the system of procuring the food resources of the forest

Constituents of the component	Fuzzy assessment
Work experience in the procurement system	medium
Average monthly wages	medium
Proportion of workers having specialized education	medium
Value of membership function in the interval [0;10] of the interval assessment of the labour component	5.2

The medium level of the labour component of the resource potential is conditioned primarily by the fact that in the procurement sphere the staff of the previous public procurement network still works. And it should be mentioned that these resources are limited due to the age characteristics. As a rule, in many procurement organizations one can see workers that do not have the skills of collecting and processing the food resources of the forest; moreover, there are no organizations for training them in the region, that is why there is a necessity to develop the labour potential in this industry.

The system of procuring the food resources of the forest is an assembly of the interacting subjects of regulation, approved rules and procedures. The low assessment of the legal component shows that the legal-regulatory base in the sphere of procuring the food resources of the forests is not developed in the Irkutsk region, as the normative-regulatory documents that are necessary for the functioning of this system are not used in reality (Table 04).

The significant term of the efficient functioning of the procurement system is available modern technologies of procuring and processing the food resources of the forest. The experts' assessment of the technological component on the basis of the fuzzy-set theory is indicative of the medium level of the technological base in the system of procuring the food resources of the forest (Table 05).

Table 04. Assessment of the legal component of the system of procuring the food resources of the forest

Constituents of the component	Fuzzy assessment
Quantity of the available legal-regulatory documents	low
Quantity of the newly-approved legal-regulatory documents for more efficient production activity	low
Diversity of the legal forms of the organizations performing the production and processing of the food resources of the forest	low
Value of membership function in the interval [0;10] of the interval assessment of the legal component	1.1

Table 05. Assessment of the technological component of the system of procuring the food resources of the forest

Constituents of the component	Fuzzy assessment
Provision of the enterprises with the modern technologies of collection of the food resources of the forest	low
Provision of the enterprises with the modern technologies of processing the food resources of the forest	low
Provision of the enterprises with the modern technologies of storage of the food resources of the forest	high

Provision of the enterprises with the modern technologies of transportation of the food resources of the forest	medium
Value of membership function in the interval [0;10] of the interval assessment of the technological component	5.2

Provision of the enterprises with modern technologies of collection and processing is at the low level though provision of them with the storage technologies is high. It is explained by the fact that the procurement companies collect and process the food resources of the forest using the technologies of the pre-reform period, but store them in the modern refrigerating equipment (shock-freezing).

The results of the assessment of the information component on the basis of the fuzzy-set theory show its low level (Table 06).

Table 06. Assessment of the information component of the system of procuring the food resources of the forest

Constituents of the component	Fuzzy assessment
Availability of the information services in the procurement system	low
Availability of the scientific researches in the sphere of the food resources of the forest	low
Quantity of the organizations training the skilled workers, including in-service training	low
Availability of the statistical information about the production sphere	low
Value of membership function in the interval [0;10] of the interval assessment of the information component	3.2

This assessment is indicative of the fact that nowadays in the territory of the region there are no statistical reports about the volume of procurement, purchase and sale prices of the food resources of the forest. There is no scientific activity that allows defining the biological and exploitable volume of the food resources of the forest, as well as projecting these indicators in order to develop the procurement strategies. Besides, in the region there are no organizations that train and teach the specialists in the sphere of procuring and processing the food resources of the forest including their in-service training. It is difficult to find the information about the great number of certificates and licenses that are necessary for procuring, processing, transporting and selling the food resources. In this context to increase the efficiency of the given industry one has to develop the information component by organizing scientific and information centres that will teach the specialists in the sphere of procuring and processing the food resources of the forest and ensure the methodological assistance to the procurement organizations.

The material and technical base is of high importance for the efficient functioning of the system of procuring the food resources of the forest. The integral value of the constituents of the given component is 2.16 (Table 07).

Table 07. Assessment of the material and technical component of the system of procuring the food resources of the forest

Constituents of the component	Fuzzy assessment
Quantity of the enterprises having the necessary equipment for procuring and processing the food resources of the forest	low

Quantity of the enterprises having the sufficient number of storage facilities and refrigerating equipment	low
Quantity of the enterprises having the sufficient quantity of vehicles for the transportation of procured raw material from the areas of collection and purchase	low
Proportion of expenses for the vehicles maintenance to total costs	low
Proportion of expenses for the equipment maintenance to total costs	low
Value of membership function in the interval [0;10] of the interval assessment of the material and technical component	2.16

The economic component is of high value in the functioning of the system of procuring and processing the food resources of the forest as the efficiency of any activity directly depends on the proportions of expenses and profits. The results of the assessment of the economic component on the basis of the fuzzy-set theory is indicative of its high level (Table 08).

Table 08. Assessment of the economic component of the system of procuring the food resources of the forest

Constituents of the component	Fuzzy assessment
Total cost of the procurement of the food resources of the forest	high
Total cost of the processing of the food resources of the forest	high
Total cost of the transportation of the food resources of the forest	high
Total cost of the storage of the food resources of the forest	low
Share of cash receipts from selling the food resources of the forest	high
Share of cash receipts from selling the other resources of the forest	medium
Share of the profitable enterprises engaged in the sphere of procurement	high
Value of membership function in the interval [0;10] of the interval assessment of the economic component	7.23

The results of the final assessment of the components of the resource potential of the system of procuring the food resources of the forest are presented in Table 09.

To develop the expert system for calculating the integral value of the resource potential of the system of procuring the food resources of the Irkutsk region, the production rules of the fuzzy inference were formulated; they are presented in Figure 02.

Table 09. Final assessment of the components of the resource potential of the system of procuring the food resources of the forest

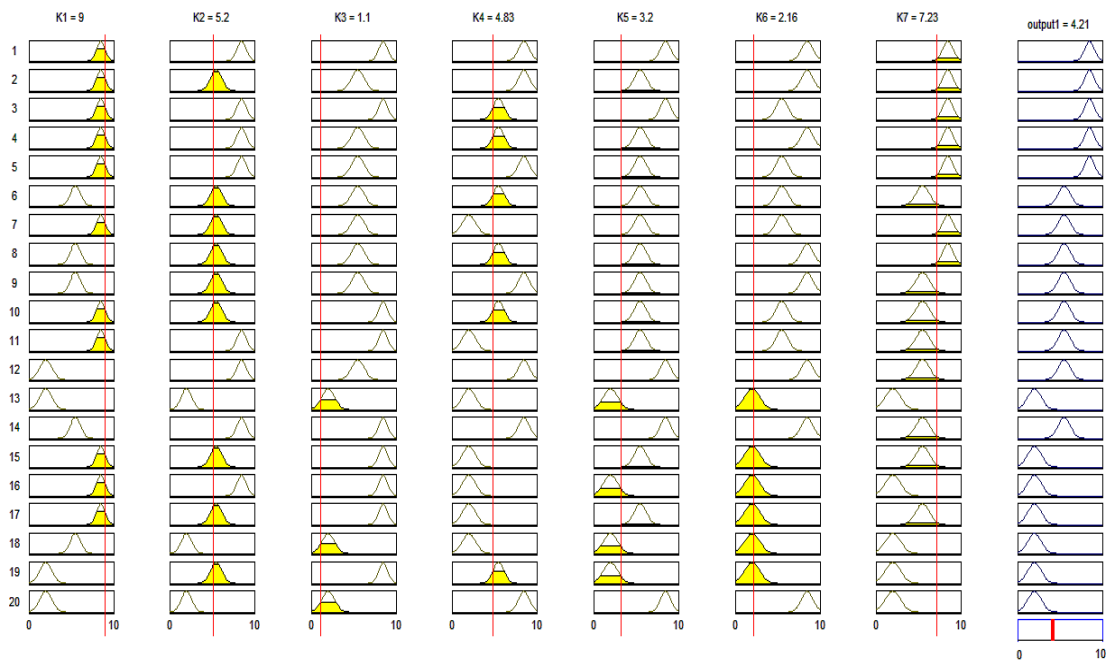| Resource	Fuzzy assessment	Value of membership function
Raw material	High	9.0
Labour	medium	5.2
Legal	Low	1.1
Technological	medium	4.83
Information	medium	3.2
Material and technical	Low	2.16
Economic	High	7.23

Figure 02. Rules of assessing the resource potential of the system of procuring the food resources of the forest in the Irkutsk region on the grounds of expert system *Fuzzy Logic Toolbox*

It should be noted that the given rules of the fuzzy inference do not contradict the earlier statements related to the fact that every component has its place and role in the resource potential of the system of procuring the food resources of the regional forests and they are interrelated; they also do not contradict the methodological base of the systematic approach to the assessment of the resource potential of the procurement system grounded on the fuzzy logics.

Thus, the results of the assessment of all the components by the expert system allowed defining the integral value of the resource potential in the form of fuzzy assessment – "medium". Having modified the fuzzy inferences used in the assessment and applied the process of defuzzification, the expert system assessed the resource potential of the system of procuring the food resources of the forest in the Irkutsk region with the value of 4.21 in the interval of [0;10] (Figure 03).
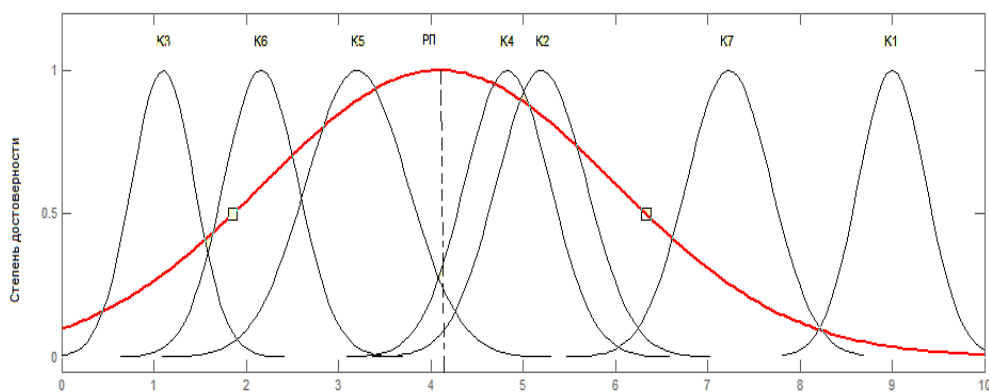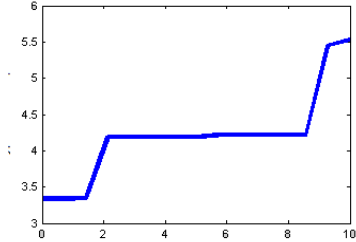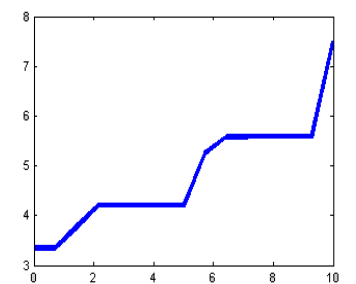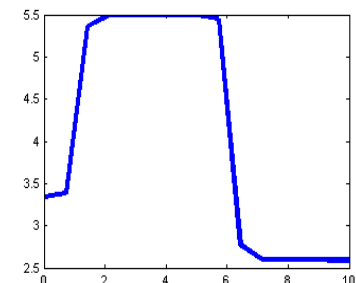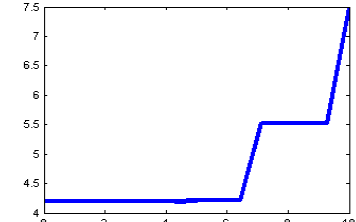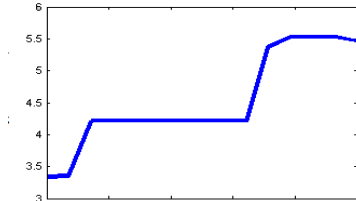

Figure 03. Value of the resource potential of the system of procuring the food resources of the forest in the Irkutsk region and of all its components on the grounds of the expert assessment by the system *Fuzzy Logic Toolbox*

At the same time, this system allowed defining the dependency of the value of the resource potential of the system of procuring the food resources of the forest on its components; this dependency is presented in Table 10.

Table 10. Dependency of the value of the resource potential of the system of procuring the food resources of the forest on its components

Dependency graph	Dependency characteristics
	The available raw materials allow procuring the food resources of the forest in the most efficient way. However, straightening of the curve is indicative of the relations with the other components as even significant volumes of the food resources of the forest cannot lead to the desirable effect without developed material-technical base and labour component.
	The graph shows that labour resources influence the value of the procurement potential very much. Their growth causes new intermittent growth of the potential of the entire system of procurement in the Irkutsk region. High-skilled specialists of the given sphere can produce and process the food resources of the forest more efficiently, at the same time the available modern technologies allow achieving the best results.
	The expert system shows an interesting dependency between the procurement potential and legal resource development. Developed and approved legal-regulatory documents allow increasing the resource potential of the system of procuring the food resources of the forest up to a certain point; then it falls. Primarily, it is caused by the fact that the large number of such documents can lead to contradictions and procurement productivity can decrease. Though if the legal system is well-balanced the potential of the procurement system will increase.
	A technological component can influence the value of the resource potential of the system of procuring the food resources of the forest only if it is at high or medium levels. When it reaches them, even its insignificant growth leads to the significant growth of the entire procurement system potential.
	The availability of information component allows procuring efficiently and the increase of this component always leads to the growth of the resource potential of the system of procuring the food resources of the forest.

	A well-developed material and technical base gives the possibility to procure and process the food resources of the forest more efficiently. The availability of the buildings and equipment for storage, modern technologies of collecting, transportation and processing always facilitate the growth of the procurement productivity. Straightening of the curve is indicative of innovative technological resources that are very important for procurement.
	Economic resource can also influence the value of the resource potential of the system of procuring the food resources of the forest. However, the value of the resource potential begins to grow rapidly only when the economic component is at the high level.

Thus, it can be concluded that the resource potential has a medium value that is expressed by figure 4.21 in the interval of [0;10]. Having analyzed the legal base of the Irkutsk region in the sphere of procuring and processing the food resources of the forest it is stated that nowadays there is no regulatory base related to the limitation and setting of the terms (beginning and end) of the seasons of procuring the definite food resources of the forest. Besides, the specialized authorities and agencies do not pay due attention to this problem and they do not introduce any initiatives. In this context it makes sense to develop and approve the normative acts regulating the rules of collecting the food resources of the forest both for the population and the procurement organizations – business enterprises of different ownership forms. As the regulatory base in the sphere of procuring and processing the food resources of the forest has some drawbacks, the organizations almost have no possibility to export their products due to the fact that when exporting, it is necessary to present purchase receipts and certificates about the origin of the food resources of the forest.

Nowadays, hardly anyone explores new areas for the procurement of the food resources of the forest as it involves investing significant funds, whereas these funds are used by the organizations in procurement, processing and transportation of the wild crop. However, all the organizations are profitable, it is proved by the high expert assessment of the economic component. In such organizations there is lack of qualified workers having the skills of processing and accepting the products. According to the results of the expert system, the labour component has fuzzy "medium" value. The integral value of the material-technical component is presented by figure 2.16. It is indicative only of the fact that such procurement organizations as Irkutskzverprom CJSC, Irkutski Oblpotrebsoyuz, Taiga Product CJSC, Travy Baikala LLC have the necessary equipment for storage, processing and transportation of the food resources of the forest. However, the availability of the modern technologies is still at the low level. Besides, in the course of the research it was found out that in 2016 the purchase of the food resources of the forest from the population was performed by 170 feedstock receptions in small amounts. They are located in big towns and villages of 26 districts of the region except the Balagansk, Nizhneilimsk, Olkhon, Taishet, Alarsk, Nukutsk and Chuna districts. There are no statistical reports about the volume of procurement of the food resources of the forest by the enterprises. There are no scientific-research centres that are to collect and project the volume of the biological yield and predictable volumes of collection of the forest resources. Besides, there are no specialized organizations that can teach the specialists in the sphere of procuring and processing the

wild crop; it is expressed by the low values of the information component. Assessing the topical problems of the main category of procures (the population of the Irkutsk region) when selling the food resources of the forest, one can mention lack of the direct access of the population to the buyers of these goods, lack of the constant demand for these goods, low sale price, high transport expenses.

In this regard, in order to increase the regional population's consumption of the food resources of the forest and to solve the problems of selling these resources by the population of the region, it makes sense to increase the volumes of procurement and processing of these goods at the expense of the development of the procuring and processing activity in the rural areas.

7. Conclusion

Therefore, the proposed methodological approach to the assessment of the resource potential of the production system on the basis of the fuzzy-set theory has a lot of advantages, namely, it allows considering quantitative and qualitative indicators as well as external and internal ones; they characterize different potential components (raw material, labour, legal, technological, information, material and technical, economic) and it helps to take into account the influence of every component, to define the internal reserves of this system and to develop the programs for increasing its efficiency. Besides, the model of the assessment of the resource potential of the production system is grounded on Mamdani's fuzzy inference system; it has the following advantage – rules of this inference system are transparent and intuitively comprehensible. It should be also noted that in the practical application, it is possible to change the indicators characterizing every component of the resource potential depending on the specificity of the production system.

The above-mentioned advantages allow different groups of users to apply this method; for example, if the resource potential of the definite enterprise is assessed, then the users are managers and owners. If the definite industry (sub-industry) is assessed, the users are those who are interested in its development, namely, the public authorities (ministries, agencies).

The proposed methodological approach to the assessment of the resource potential of the production system was tested when implementing the measures to develop the sphere of procuring and processing wild crop resources growing in the Irkutsk region. So when assessing, it was found out that a lot of factors influenced the procurement of the food resources of the forest: natural climatic conditions, geographical location, biological productivity of the forests, proximity of the territory, availability of the land, labour and material resources. In this context every district of the region must have an individual approach to the activity of collecting the food resources of the forest. The analysis showed that the results of the assessment of the districts related to their provision with labour and material resources and to the natural-climatic conditions and geographical location are almost the same. Moreover, all the districts of the region have a lot of experience in procurement of the food resources of the forest and significant labour resources, they lack material resources, though all the indicators are dynamic.

References

Anastase, I. (2013). Factors affecting the productive potential of the enterprise. *SEA - Practical Application of Science,.I., 1(1)*. 7-15.

Andreeva, E.S., & Nechaev A.S. (2013). The mechanism of an innovative development of the industrial enterprise. *World Applied Sciences Journal, 13,* 21-23.

Bessonova, E., & Mereshchenko, O. (2017). Methodology of the resource potential assessment under import substitution. *Economic Annals-XXI, 163(1),* 91-94.

Kostylev, A.A. (2010). Approaches to estimation of natural resource potential and indicators of effectiveness of its use in the region. *Socio-economic phenomena and processes, 3(19),* 110-118

Levin, V.I. (2001). A new generalization of the operation on fuzzy sets. *Theory and control systems, 2001, 1,* 143-146.

Mashenene, R.G., & Rumanyika, J. (2014). Business Constraints and Potential Growth of Small and Medium Enterprises in Tanzania: A Review. *European Journal of Business and Management, 6, 32*, 72-79.

Nechaev, A.S., Antipin, D.A. & Antipina, O.V. (2014a). Efficiency estimation of innovative activity the enterprises. *Journal of Mathematics and Statistics, 10 (4),* 443-447.

Nechaev, A.S., Antipina, O.V. & Prokopyeva, A.V. (2014b). The risks of innovation activities in enterprises. *Life Science Journal, 11(11),* 574-575.

Noskova, E.V., & Romanova, I.M. (2015). Methodological approach to assessing the resource potential of wholesale trade in a region. *Actual Problems of Economics, 167(5),* 288-296.

Poludova, G.R. (2016). Management of production system with use of fuzzy logic. *New science: problems and prospects, 6-2(85)*, 222-224.

Rashchupkina, V.N., & Kozlova, L.V. (2016). Process approach to management of production systems. *Eastern European scientific journal, vol.7, 4*, 76-81.

Silich, O.A. (2016). Evaluation of the potential of formation and development of regional clusters based on the theory of fuzzy sets. *Newsletter NSUEM, 1,* 153-163.

Tyapkina, M.F., Ilina, E.A. & Ilyashevich, D.I. (2017). Optimization model of production and product sales within profit maximization. *Advances in Economics, Business and Management Research, 38*, 246-251.

Ylimaki, T. (2006). Potential critical success factors for enterprise architecture. *Journal of Enterprise Architecture, Vol. 2, 4,* 29-40.