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SCIENTIFIC ACHIEVEMENTS IN AGRICULTURAL ENGINEERING, AGRONOMY AND VETERINARY MEDICINE

RESOLUTION OF ENERGY PROBLEMS OF LOCAL SELF GOVERNANCE UNDER THE CONDITIONS OF ADMINISTRATIVE REFORM IN UKRAINE

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KEYWORDS

decentralization, local self-government, local community, renewable energy, energy willow, biomass, Khmelnytskyi region.

SUMMARY

The first steps of decentralization in Ukraine are described in the article. State legislative initiatives to enhance local self-government, issues and achievements of voluntary united local communities are described in the article. it is noted that for the purpose of revenues to local budgets it is appropriate to carry out energy saving measures. Wide implementation of renewable energy sources, including biomass, is offered in the article. it is noted that Khmelnytskyi region has favorable natural and economic conditions for the implementation of energy willow plantations as local renewable energy sources. on the example of a particular local community there is reflected an actual use of natural gas and solid fuel during the heating season of 2016-2017 and possibility of creating energy willow plantations and use of chopped wood for heating of social sphere premises are grounded..

1. INTRODUCTION

In Ukraine the right of citizens to solve issues of local importance is guaranteed by the state and is the real ability of local communities [Konsty`tuciya Ukrayiny` 1996] that in most of them remain unfulfilled. Self-sufficient and strong local communities are the basis of the local and regional development of any country. it is also a feature of quality and efficiency of local self-government, less bureaucratic to facilitate the development of local democracy, supporting the initiatives of citizens. the main reasons for inadequate development of local self-government in Ukraine are economic (lack of material and financial resources), political (lack of real self-sufficient local communities with appropriate formation of local budgets), legal (lack of legal support for the organization and functioning of local self-government, its relationship with the community members, community organizations, businesses and institutions), psychological (existence of the old stereotypes concerning the local self-government in the minds of citizens).

In the development of reforms towards decentralization Ukraine uses European Charter of Local Self-Government [Yevropejs`ka hartiya 1985; Zakon Ukrayiny` №452 /

97 1997] and European experience. Power decentralization is a complex process that involves diverse aspects most important of which are the budget and fiscal decentralization, the possibility of forming independent community budgets. Specific changes in the direction of decentralization in Ukraine appeared after the adoption of the basic legal documents for improving and strengthening the independence of local communities by the Verkhovna Rada of Ukraine in 2014 [Zakon Ukrayiny` №1508-18 2014]. Especially important was the approval of the Cabinet of Ministers of Ukraine the Concept of reforming the local government and the territorial government in Ukraine [Rozporyadzhennya KMU №333 2014] and the action plan for its implementation [Rozporyadzhennya KMU №591 2014 and №688 2016]. Adoption of the Laws of Ukraine on Amendments to the Tax Code and the Budget Code [Zakon Ukrayiny` №1789-19 №1797-19 2016 and 2017] became a stimulus for communities to unite and increase their self-sufficiency.

Since 2015 with the support of the US Agency for International Development, the Council of Europe and some other countries of the world in Ukraine there are real changes in local self-government, which began with local elections in municipalities (October) and the creation of the first 159 voluntary united local communities (ULC) that function since the 1st January 2016. in Khmelnytskyi region 231 of 605 communities (38.2%) or 531 of 1451 settlements (36.6%) have united. There were established 22 local communities (ULC) with an area of 428,000 hectares [Yaczkovs`ky`j S.V. i in. 2016].

Creation of conditions for communities to exist with a full value, formation of adequate legal and economic framework for their development are the main priorities of the planned changes. During one and a half year of existence of voluntary united local communities there have taken place significant changes in their financial situation and therefore development opportunities. Planned indicators of local budgeting on the results of 2016 were exceeded by all communities, which increased their incomes per capita nearly 3 times.

During the first six months of 2016 the state granted targeted subsidies for united local communities of the region in amount 358 million UAH, of which 72 million UAH are intended to form the infrastructure. Also in 2016 by the state there was allocated 1 billion UAH to infrastructure forming for 159 ULC, which was distributed with the regard to the number of rural residents and area. Khmelnytskyi region received 216.4 million UAH [Yaczkovs`ky`j S.V. i in. 2016]. This allowed to implement a number of important for communities infrastructure projects: improvement of water supply by constructing artesian wells, water pipelines; reconstruction of sewage treatment plants; the purchase of special

equipment (including fire engines); overhaul of roads; capital repairs of schools, pre-schools, administrative offices; street lighting. at the same time energy efficiency projects were almost not implemented.

The well-known problem of Ukraine's energy dependence is caused by the high energy intensity of different branches of the national economy and overspending of energy by municipal objects and people. the state has enormous renewable energy sources, but the development of alternative energy sources is growing very weakly. According to the State Statistics in Ukraine in 2013 the share of renewable energy in gross final use was 3.62%, including biomass - 2.28% (2.7 million tons of conventional fuel). in 2014 "National action plan on renewable energy by 2020" was adopted in Ukraine[Rozporyadzhennya KMU № 902-r 2014]. According to this plan the share of renewable energy sources in the final use should be 11% and biomass of them should be 85%. but it is clear already now that this plan will fail because there are no effective mechanisms of the state support for financing projects, and also just a few projects are proposed by local communities.

Among the fifteen ULC of Khmelnytskyi region only in three implementation of energy saving technologies, switch over of boiler houses to alternative fuels, modernization of systems of consumption of thermal energy are declared for the future. Only in one of ULC (village Chornyy Ostriv of Khmelnytskyi region) owing to local agricultural firm there was planned implementation of technologies using renewable energy sources, "to promote the development of production and use of biofuels, the creation of local raw materials for biofuel production".

There are various sources of renewable energy, biomass in Ukraine is preferred. However, in conditions of intensive farming, with a constant decrease in soil fertility, it is inappropriate to alienate a significant number of plant residues after harvesting (according to various estimates, it is possible to take from fields 10-30% of the biomass after harvesting). but studies of the authors showed that the current structure of crop areas and yield of field crops and the lack of livestock industry in Khmelnytskyi region are making insufficient plowing even of all plant remains to ensure non-deficit balance of humus [Vahnyak, Kozhevnikova 2014]. Therefore, biomass from energy crops should be preferred.

Energy willow has its biological and technological features that allow it to be considered as the main energy crop for Khmelnytskyi region. the conditions of the region are suitable for this crop both from the point of view of natural resources (climate, soils, hydrology of the territory) and economic resources (inefficient use of other land rather than arable land, environmental problems related to the intensive agricultural

sector and high plowing of the territory, availability of equipment at agricultural enterprises, which can be adapted for the technology of crop cultivating, experience of using alternative fuel based on chopped wood, etc.). in view of the territorial diversity of natural and economic conditions, we consider the raise of energy crops to be only as a local resource for improving the economic activity of local communities, local enterprises, etc.

The northern part of the region is situated in Polissya (forest zone), the rest - in the western forest-steppe zone. the moisture content of the territory, excepting a number of recent years, is sufficient. According to a comprehensive, qualitative land evaluation (100 point scale), which includes fertility indices, pollution level, erosion, hydromorphism and climatic conditions, the soils of the arable land in Khmelnytskyi region belong to the following groups (Table 1). in modern conditions, the agrarian sector of the economy in Ukraine is one of the main ones that fills the budget and is strategically important. Therefore, the most fertile soils should be used to grow the main field and fruit crops, and it is expedient to use low-quality soils, not higher than 40 points, for energy willow. the area of such soils in the region is 51.6 thousand hectares, but they also include eroded lands, which moisture content may not be sufficient for energy willow. Among the forest-steppe districts of the region, the soil of low quality is found to be from 1.1% in the relatively flat Teofilpol district to 45-53% in Letychiv, Derazhnya and Nova Ushitsya districts with difficult terrain.

Tab. 1. Qualitative estimation of the arable land of Khmelnytskyi region [Gavry`lyuk i in.2010]

Land quality	Category	Points	Area, thousands of hectares	% of arable land
Very high	1	91-100		
	2	81-90		
High	3	71-80	8,0	0,9
	4	61-70	107,7	11,6
Increased	5	51-60	308,7	33,2
Middle	6	41-50	294,1	31,6
Low	7	31-40	159,4	17,1
Very low	8	21-30	49,5	5,3
	9	11-20	2,1	0,3

Different processes of soil degradation according to Krupennykov's classification [Krupenny`kov 2008], which are the cause of poor quality of land, appear in the districts of the region. in this case, there appears their distinct geographical distribution. Processes of chemical (dehumidification, decalcification, worsening nutritional regime, secondary acidification) and physical degradation (loss of structure, compaction) appear almost

on the entire arable land, physical - hydrogenous - mainly in the southern and eastern parts (water erosion), northern (waterlogging) [Vahnyak, Kozhevnikova 2014].

However, it is possible to use other lands, for example, hayfields and pastures, some of which are located on periodically (temporary) or permanently waterlogged soils. Soils with sufficient moisture reserves should be preferred when placing energy willow plantations, especially considering the current trend of global warming and more frequent droughts.

Table 2 shows those agro-industrial groups of soils of the region that have genetic signs of overflow. Predominant among them are fluvisols, histosols and pheozems [Pol`chy`na and Vahnyak 2012], the main arrays of which are confined to a particular geographic environment. Totally in the region there are 60,8 thousand hectares (4,8%) of meadow and marsh soils (permanently waterlogged) [Gavry`lyuk i Vahnyak 2014]. in the forest-steppe part of the region, their area occupy from 0.7 thousand hectares (1.0%) in Dunaivtsi district to 5.2 thousand hectares (6.3%) in Volochysk district.

Tab. 2. Distribution of waterlogged soils in Khmelnytskyi region

Soil groups in the classifications of Ukraine and world		Territorial placement in the region
Nomenclature list of soils of Ukraine	World Reference Base for Soil Resources (WRB) [FAO 2006]	
Clear gray and gray forest ashed loam, gleyic and surface-gleyic	Pheozemsendogleyic, gleyic,luvic	Forest-steppe part, mainly southeastern
Dark gray and chernozems ashed loam, gleyic and surface-gleyic	Pheozemsendogleyic, gleyic,luvic	
Meadow-marsh, mud-marsh and peat-marsh	Fluvisols gleyic	Locally across the region
Peat-marsh and shallow peatlands	Histosols	Preferably, in Polissya part, locally everywhere
Medium and deep peatlands medium and strongly decomposed	Histosols	
Meadow-chernozem loam and gleyic	Umbrisols gleyic Chernozems luvic	Locally in depressions of the forest-steppe part
Turf shallow and deep gleyic and loam	Arenosols mollic, haplic Gleysols umbric, luvic	Preferably Polissya, rarely in the south
Alluvial	Fluvisols gleyic Umbrisols gleyic	Floodplains and terraces of rivers

In different united territorial communities there is a different soil cover structure by the suitability for high efficiency of energy willow plantations. For example, in Berezdiv ULC of Slavuta district there are relatively large areas of histosols, in Medzhybizh ULC of Letychiv district there are large areas of fluvisols due to placement in the lowland area, in the Kolybaivka ULC of Kamyanets-Podilskyi district glued varieties of pheozems (bedded with waterproof clay) are the predominant resources for energy willow.

It should also be noted that the region has a relatively large territory for a natural reserve, which is one of Europe's largest National Natural Park "Podilsky Tovtry". Therefore, placement of energy willow plantations in the park's economic zone and other reserves will increase the effectiveness of preserving natural landscapes and biodiversity, and increasing the ecological stability of landscapes. This is very important for the protection of wetlands, restrictions on the intensive use of land near water bodies, increasing erosion stability of landscapes, regulation of water regime of territories.

On the example of Kolybaivka UTC in Kamyanets-Podilskyi district, it is possible to understand the problem of the need to preserve energy sources and to increase energy efficiency (Table 3). the largest consumers of gas are the school and village council in the village Kolybaivka, of coal and firewood - other schools and kindergartens. the cost of used gas and solid fuels is different – 2707.1 thousand UAH were spent on the purchase of gas, 277.3 thousand UAH were spent for coal and firewood.

Tab.3. the actual use of fuel for heating of objects of social sphere in the heating season 2016-2017 in Kolybaivka UTC in Kamyanets-Podilskyi district

Objects	Heated area, sq. m	Type of fuel	Type of boiler	Spent on heating in 2016-2017	Cost of heating, thousand UAH
Schools					
village Khodorivtsi	1291	coal	Calavi 130	52 tons	178,8
village Kolybaivka	1002	gas	modular boiler	19,5 thousand m^3	173,2
village Ostrivchany	598	coal	Cadvis	11 tons	38,8
village Knyahynyn	298	coal	stove heating (6 pc.)	6 tons	20,3
Kindergartens					
village Khodorivtsi	210	gas	Convectors	9.8 thousand m^3	87.0
village Kolybaivka	113	gas	Convectors	4.8 thousand m^3	42.7
village Ostrivchany	186	coal	Calavi	9,3 tons	31,5
village Knyahynyn	168	electricity	Dnipro	22.5 MWt	50.5
Administrative buildings					
Village council	867	gas	Convectors (14 pc.)	264.6 thousand m^3	234.5
Post offices (4 departments)	62	gas	Convectors (4 pc.)	3,3 thousand m^3	29,2
	34	coal	stove heating(2 pc.)	1,7 tons	5,8
Medical establishments	outpatient clinic, medical center	gas	Convectors	2,1 thousand m^3	18,6
	2 medical centers	coal	stove heating(2 pc.)	1,8 tons	6,1
Library		gas	Convector	1,32 thousand m^3	10,8
Clubs	Periodically are heated by the stove heating				

Notes. 1. the service of boilers and oven by operators of ovens is not taken into account. 2. the actual price of natural gas was 8862 UAH per1000 m^3, coal - 3390 UAH · t^{-1}.

In our opinion, the main arguments for the use of energy willow as an alternative source of energy specifically for the Kolybaivka territorial community are as follows.

1. on the territory of the UTC there are 306.9 hectares of reserve land, 550.6 hectares of land stock. the communal property has 245.5 hectares of land. in the community,it is possible to implement the most economically advantageous closed cycle in the cultivation of biodiesel and its use (processing) [Yaczkovs`ky`j S.V. i in. 2016].
2. Agricultural enterprises on the territory of communities own only arable land (5765 hectares), they have no other land. Considering the specialization of farms (field crop production), it is impossible to count on their active participation in the laying of willow plantations. Relatively low, as for chernozems, the organic matter content in arable soils (at the level of 2,18-3,42) causes the need for planting residues to be halved, and not to use them as biofuels. However, they can provide technical assistance, for example, covered canopies for storing chopped wood and its final drying.
3. Along with this, on the territory of the community 68 people cultivate the land with total area of about 160 hectares on their own. Among them 16 families own land plots from 2 to 8 hectares (total 62 hectares). the sole commodity producers have 12 tractors, 2 trucks, 1 combine. the efficiency of their production is extremely low, therefore some of them are ready to co-operate, including for the implementation of new projects.
4. on the territory of the community there are insufficiently fertile and difficult to use periodically waterlogged gleyed types of gray forest soils, suitable for growing energy willow.
5. in UTC there is a placement of social facilities in settlements (educational, cultural, medical facilities), which allows them to be combined into a single heating network from one boiler house, to modernize the heat transfer to the premises.
6. the UTC territory is fully included in the National Natural Park "Podilsky Tovtry", which imposes certain restrictions on the use of natural resources and necessitates the implementation of environmental projects. the cultivation of energy willow has an ecological orientation. Also, for the community and for the tourist city of Kamyanets-Podilskyi, some nuisances create an unpleasant smell from the fields of the local distillery. Growing willow in these fields would obviously contribute to a partial resolution of the problem.
7. the region has an experience in growing willow and an experience of using wood chips for heating. Municipal enterprise of the city of Kamyanets-Podilskyi uses

a boiler-house on chopped wood and pellets, own raw material base is created. in the neighboring Ivano-Frankivsk, Lviv, and Volyn regions there are firms that grow and sell willow seedlings with a relatively low cost, provide services for planting and growing plantations. the company "Salix energy" in Volyn region grows Swedish energy willow on an area of 1.5 thousand hectares and provides the heat supply for the State District Administration, department of education, schools, kindergarten, museum, district hospital.

8. in Ukraine, there is, albeit an imperfect, market of equipment of various capacity for combustion of chopped wood of willow of different humidity. the cost of boilers is available to the community budget.

Taking into account volumes and cost of consumption of gas and solid fuel by objects of social sphere, cultivation and use of energy willow for heating of premises is economically expedient. First of all, it should be noted that the cost of 1 GJ of energy received from natural gas combustion in Ukraine is 0.097 UAH, coal - 0.054 UAH, and crushed wood of energy willow - only 0.007 UAH. [Lopushniak 2016]. If we consider the productivity of an energy willow plantation at the level of 10 odt with a lower heat of combustion of 18.5 GJ•t-1, then 1 hectare of willow will provide an output of 185 GJ•t-1 per year [Py`rikov 2016]. and this is equivalent to 5.18 thousand m3 of natural gas (combustion heat 35.88 GJ•1000 m-3) or 7.11 tons of coal (combustion heat 26 GJ•t-1). Accordingly, the cost of gas equivalent to the energy of 1 hectare of willow is 45.7 thousand UAH, and the cost of coal at actual prices as for the heating season 2016-2017 is 24.1 thousand UAH. it should be noted that for the next heating season in the budget of the local community, the price of coal is set at 3600 UAH•t-1, and it is expected to be higher. in this case, the project's efficiency increases.

The cost of cultivating energy willow is, according to various estimates, from 4.7 - 7.7 thousand UAH•ha-1 [Lopushnyak, Gry`czulyak 2016] up to 7-8 thousand UAH [Py`rikov 2016]. However, taking into account the dynamics of prices in Ukraine, according to our calculations, the cost is 11-13,5 thousand UAH•ha-1 (taking into account the cost of seedlings, technological operations of planting, caring for plantation, harvesting, transportation, crushing and storage of crushed wood). the cost of one ton of crushed wood is from 190 to 220 UAH•t-1. Therefore, the replacement of natural gas gives it an effect of about 32 thousand UAH per hectare of plantation, and coal - about 11 thousand UAH.

The need for an area of willow plantation is 70-80 hectares for the complete replacement of natural gas and solid fuels in the united territorial community, which frees

up to 2 billion UAH in the budget. Taking into account the length of use of plantations of energy willow (25-30 years), its implementation in the community is perspective.

2. CONCLUSIONS

Ukraine has established a regulatory framework for administrative and territorial reform. the processes of decentralization of power in Ukraine contribute to the autonomy of local communities and call for the search for effective projects to improve their economic situation. Implementation of the production of chopped wood of energy willow in local communities is expedient in terms of increasing the efficiency of the use of natural resources and saving budget funds for the heating of objects of social sphere. Natural and economic conditions are favorable for the implementation of energy willow plantations and the use of its biomass for the production of heat. Replacement by the crushed wood of energy willow of 305.4 thousand m3 of natural gas and 81.8 tons of coal in a specific territorial community frees about 2 billion UAH of budget funds for the year.

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PSYCHOLOGICAL AND PEDUGOGICAL TRAINING OF OCATIONAL SCHOOL TEACHERS AT SPECIALIZED HIGHER EDUCATION ESTABLISHMENTS

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psycho-pedagogical training, model training, functions and approaches of the engineering-pedagogical training, engineer-farmer..

ABSTRACT

Modern requirements for the activity of an engineer-farmer warrant the development of the new concepts and models ofpsychological and pedagogical training in the specialized university. This model, focused on the formation of administrative and human competencies of future specialists, should be based on certain methodological characteristics.

Methods. the analysis of studies in the psychology and pedagogy, the survey, generalization and modeling of the research problem.

Results. the model characteristics of psycho-pedagogical training of engineers in specialized agricultural university, indicators and guidelines of implementation for the appropriate model have been identified.

Discussion. the problem of succession and continuity of psycho-pedagogical training of an engineer-farmer student at profile university reqidres the further study.

1. INTRODUCTION

System changes in society, being relevant to science and technology, forecast changes of requirements for the quality of professionals' education and training. Therefore, the national higher educational system is required to design a conceptual paradigm of proficient professional education, providing its methodological support. This paradigm must take due account of modern life demands, as well as prospects for development of a particular field of science. the problem mentioned is of particular concern for agricultural engineering education, in a view of the fact that it combines both conservatism and internal dynamics.

The question of responsiveness of higher education sector output to social demands has received much attention in recent years. Many agricultural engineering universities graduates start their career as production managers, unwittingly becoming involved

in functional (or at least mid-level) management of the company. in practical terms, they have to work with real people, and, as a result, be engaged in educational and pedagogical activities. Challenges, facing human resources management, stay just as important as productionand process engineering. Therefore, agricultural engineering university graduate must be ready to precise as an org-man since day one, demonstrating creative thinking, sufficient personal and professional qualities, ability to find operational solutions, and high level of social and. professional responsibility. the most important requirements to engineering industry graduate are: high level of culture; systemic integrative education; occupational mobility; administrative ability; and communication skills.

Psycho-pedagogical training of a skilled specialist includes development of the ability to work with people, taking into account their individual characteristics, as well as emotional and intellectual states, and use their own reserves to build constructive relations both vertically and horizontally. Before 1994, psycho-pedagogical disciplines typically weren't included in training programs at non-teaching universities. Since 1994 training programs of all universities have been complemented with the discipline 'Psychology and Pedagogy', later being replaced by the 'Psychology'. However, content of both courses didn't (and still doesn't) meet the requirements for professional activity of agricultural engineering universities graduates.

Present system of two cycle training of agricultural engineer at university includes psycho-pedagogical competences mastering on two levels:

1) general professional training, provided by the 'Psychology' course as a component of humanities training (Bachelor Degree);
2) Master Degree training at agricultural engineering universities, including courses in 'Engineering Psychology', 'Pedagogy in Higher Education', 'Psychology in Management', in a view of the fact that the holder of master's degree to be focused on administrative or teaching activity.

At the same time, psychological and pedagogical training at agricultural engineering universities has several key deficiencies: lack of differentiation and continuity in learning process, caused by the gap between different types of classes; fragmentariness of training subjects that keeps from the coherent picture of subject creation; lack of focus on basic functions of professional activity and professional problems solving.

In a view of challenges mentioned above, the model of agricultural engineer complex training needs to be established. This model must be focused on increasing the role of the personal factor of production efficiency and rethinking the objectives and content

of professional activity of engineer, provided by increasing of organizational and management functions.

Analysis olf recent research and publications. Various aspects of psycho-pedagogical education have received much attention in recent years. a grooving body of literature in the field of pedagogical science has studied some problems of steadiness and continuity of teacher education (S. Goncharenko, G. Gurevich, I. Zyazyun, A. Kovalenko, H. Kostiuk, N. Nychkalo), integrity of teacher training (B. Likhachev, V. Ilyin), evaluated the patterns of personality development in a system of lifelong learning (I. Zymnyaya, N. Kuzmina S. Sysoiev) etc.

The engineering education literature focuses on scientific substantiation of technical university students' psychological support (A. Brushlynskyy, V. Vzyatyshev, M. Nechayev), training of engineering and pedagogical universities students (V. Bezrukov, E. Zeyer, V. Lednov), as well as designing issues of university educator's professional training (L. Hurye, V. Ivanov, A. Kirsanov).

Unfortunately, there is still considerable disagreement between declared significance of psychological and pedagogical education in professional's training and inconsistency of methodology of lifelong continuous professional orientated psychological and pedagogical education of agricultural engineer.

Therefore, the purpose of this research is to review the characteristics of psychological and pedagogical training of agricultural engineering university student, its relevance for future professional activity, and special aspects of development of psycho-pedagogical training model for engineers of the agricultural sector.

2. MATERIALS AND METHODS

The analysis of studies in the psychology and pedagogy, the survey, generalization and'modeling of the research problem.

3. RESULTS

A discussion of defined problem indicates that the most common approaches to the analysis of professional and pedagogical training of the specialist are based on their specifics, features (tasks, functions, and jurisdiction), differences from other activities, and requirements to address certain specific administrative and management decisions.

The need for psycho-pedagogical training of students at agricultural engineering universities, as well as expanding its content, was caused by data conducted within the framework of research on farms managers in Western Ukraine, provided by the Departmentof Vocational Education, State Agrarian and Engineering University in Podilya. Almost all of respondents noted the need for management training in professional agrarian engineers education, expanding their awareness of human resources management. Similar results were obtained by researchers at the Kharkov Polytechnic University [6]. All respondents stressed the importance of disciplines such as 'Psychological and Educational Impact', 'Conflict Management', 'Effective Communication' etc. for engineer training.

Psycho-pedagogical training at engineering university, according to O. Romanovskoho [5], is provided due to the following production system trends:

1) changing in social production nature and goals, its anthropocentrism;
2) increasing the role of human factor, which determines efficiency of administrative action, taking into account individual characteristics of each personality;
3) the fact that professionals expends much of their time in communicating, extending communication management skills. This is why psychological competency and culture of interpersonal communication becomes an integral element of agrarian engineer training;
4) the effectiveness of group activities is mainly determined by the psychological climate in team and psychological comfort of each person;
5) every person during professional experience have to perform a significant amount of activities associated with physical, emotional and psychological stress. in this regard, training process at higher educational institutions must provide development of student's emotional- volitional system, and resilience to stress;
6) specialists must be aware of their abilities, possibilities and limitations, reveal their inner psychological reserves to set the best possible targets and successfully organize group work. For this purpose they need to be aware of self-improvement and self-actualization methods and means that may be provided by psychology and pedagogy;
7) engineers' activity is driven by the need for education and training of people they works with;
8) each specialist in addition to his professional activities realizes himself in family life, requiring for psychological and pedagogical knowledge.

The provided analysis has confirmed the fact that psychological-pedagogical disciplines are complex, controversial, interesting part of professional training, based

on students' experience and content insight. Each specialist must understand that his psychological and pedagogical competency can provide professional and personal success.

According to V. Slastonina, 'Pedagogical skills are very difficult to separate in practice from various other personal qualities that affect the professional success. They exhibit, emerge and develop as an integral part of the system of properties, relationships and actions of individual... and represent synthesis of different abilities, qualities of mind, feelings and will'[8, p. 7]. and this seems to be an innovative approach. So, acquisition of key teaching skills are of the essence of professional-pedagogical training that can be provided by psychological literacy and is crucial for addressing the significant professional management and communication problems. Thus, the following assignments may be suggested:

1. Situation analysis, result designing, planning and organizational of administrative actions;
2. Design and implementation of professional activity (organizational, project, communicative, group, etc.);
3. Profession activities regulation;
4. Accounting and assessment of results, and identifying of new challenges.

The allocation of these actions is based on the concept of human activity, according to which the structural elements of mediation, regulation and control are distinguished. Implementation of these actions requires mastering of pedagogical knowledge and skills that are "refracted" through personal characteristics, getting personal perception and causing the selection of one of many possible options - the most appropriate one [3, p. 127].

Tremendous up growth of science and engineering, replacement of some old technologies with new ones, innovative processes in a field of agriculture and agrarian business require constant development of engineer's intellectual capacities, as well as education quality increase due to anthropocentric approach. Therefore, psychological and pedagogical (and humanitarian as such) training model for modern engineers at agricultural universities should be continuous in its nature, satisfying the requirements of humanism, subjectivity, autonomy, and activity. in this context it seems advisable to use V.E. Deming's PDCA Cycle (Plan-Do-Check-Act, i.e.

Analyzing the problem - developing a potential solution - measuring the effectiveness - implementing the solution) [9]. Deming's Cycle, on the one hand, provides continuity of engineer's psychological and pedagogical training on both levels of higher education, on the other hand, underlines this continuity and guaranties its quality (fig. 1).

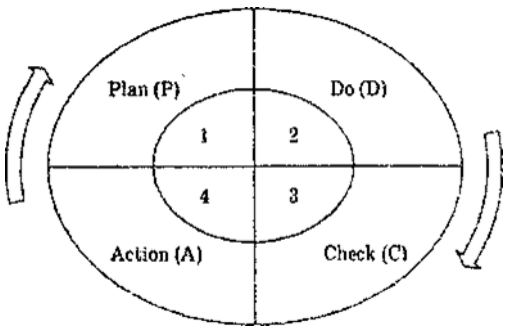

Fig. 1. the cycle engineer's psychological and pedagogical training(by Deming)

In educational practice, implementation of this model is based on the following principles:

- polyfurcation, providing that professional, organizational and managerial competence include cognition, creativity, communicativeness, reflexive activity and professional experience activity;
- educational integration, providing system integrity and continuity of all components of training process at different levels of psychological and pedagogical education of engineer (targeting, motivational, substantial, procedural, controlling and evaluating), and at the same time liaising organizational development and communication professional skills mastering;
- affiliation, aimed at developing of students sustained, informed and positive attitude to their profession orientation, their commitment to succeed, need for developing skills and productive interaction with others;
- congruence, providing self-realization and self-assertion;
- reflected subjectivity, relying on the principle of representation of some ideal human life situation for solving the reality situation of another.

The most important structure-forming component of the model is development of students learning and researching motivation, grounded on their readiness for lifelong learning. it can be provided by participation in students' psychological and educational partnerships, university (regional, national, international) student conferences, forums, academic competitions, including development and implementation of scientific and educational research projects; cooperation with university psychological service, including essays and research papers writing in a course of studying psychological and pedagogical disciplines; active use of modern information forms and methods, integrative organization of educational process. Modem rapid changes in the market economy environment require the engineer to be ready for prompt response, and making adjustments in his own activities, as well as activities of employees. However, these qualities wouldn't

be developed without continuous improvement of professional skills and personal qualities. That is why the process of continuous psychological and pedagogical training has to satisfy the following requirements: firstly, to be insightful; secondly, to provide a sequence of courses, programs, complementing and developing each other; thirdly, to integrate traditional and innovative teaching methods, combining academic and professional administrative activity; fourthly, to develop and, if necessary, generate appropriate personal and professional competencies at different educational levels.

The next structural component of the model is improving the student's professional engineering skills through development of methodological and motivational culture and creative activity. Methodological culture is the basis of creative style of thinking, activity, and communication, providing professional engineering competencies (professional tasks solving, assessment of current and final results of choice made, implementation of group interaction technologies, application of advanced science achievements within the discipline). Creative activity of an engineer (measure of profession and professional activity satisfaction, evaluation of professional orientation, development of communicative competence, desire to improve own knowledge, experience) causes the development of co-creation activity. Therefore, its purpose is to form and develop major skills of project management, conflict management, managerial decision making, teamwork and ability to solve professional situations.

Another component of the model is construction of an integrative training system based on variant integration mechanisms.

Such mechanisms can be introduced into university education process through integrated courses aimed at thematic and objective integration of psychological, pedagogical and professional disciplines; use of various integrative forms of education, focusing on intellectualization of students activities, development of their academic autonomy and ability to self-realization and self-education; subjective integration, i.e. considering students as subjects of pedagogical process, able to goal-setting, planning, organizing, adjusting their education; performing certain social roles (lecturer, reviewer, etc.) under teacher guidance; emotional saturation of educational material. Methodological core of this integrative humanitarian approach is based on ideas of the unity and interrelation of all sides of human existence, recognizing man as a microcosm of the world. Therefore, the key element of humanitarian integrative approach is human, taken in all the richness of internal and external communications, described by V. Shubinsky as 'biological psychological social natural cosmic creature'. This person is collaborative. Harmoniously integrating a variety

of aspects of human existence (cognitive, creative, artistic, emotional and sensual, rational and analytical, mystical and religious, active et al.), such person is capable to carry on a dialogue with nature, socio¬cultural environment, past and future. This approach is extremely important for understanding of the nature of engineering in industrial world. External dialogue is impossible without self dialogue. Man, who has not learned to understand himself, is unable to understand.-others. Thus, reflexive abilities of an engineer have turned to be necessary personal and professional skills that launch their existence at higher education institutions and continue to evolve throughout life.

The evidence from our study points towards the idea, that optimum implementation of these models in educational practice require abidance by following terms: 1) organizational; 2) technological; 3) psychological and educational; and 4) scientific and methodical.

The qualitative difference of this model is that it is not only the psycho-active, but also personalized in its nature, and provides an active, creative approach to development of individual skills and self education abilities, as well as self-concept personalization.

4. DISCUSSION

Psycho-pedagogical education is one of the means, providing humanization and fundamentalization of students training at agronomic engineering universities. Its effectiveness is strongly influenced by educational content, materials scientific character, and target orientation of training sessions.

The proposed model determines the development of motivational-value, communication, and reflective components of engineer's psycho-pedagogical competency. This is the area, where the processes of intellectual potential formation, memory, attention, thinking, communication skills takes place, creating an educated professional and a thinking person.

5. CONCLUSIONS

Knowledge, skills and abilities obtained by engineers during specially organized psychological and pedagogical training, allows them to solve skillfully psychological, management, production and other tasks by using the human potential.

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