Using of digital methods for personnel training in Vietnamese forest sector

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Abstract. The relevance of this article is due to the importance of forest resources for each state, since they play a special role in development from economic, environmental and social point of view. This statement is also relevant for Vietnam because forests of the country are rich in resources and preserve rich biological diversity. However, improper forest management leads to deforestation and forest cutting. The aim of the article is a theoretical justification for the need to improve the Vietnamese forest management system by training personnel using digital methods of education. The validity of the results and recommendations is ensured by the integrated application of general scientific methods, such as dialectical means of cognition, a systematic approach, structural and functional analysis methods, systematization and generalization, the principles of formal logic, the presentation of tabular material, etc. The result of the study is a suggestion to create a system of digital forest pedagogic for personnel training in forest management in Vietnam. The created system will allow minimizing the influence of the negative factors on the development of Vietnamese forest management. It is substantiated that many problems can be solved through training by using digital methods of education.

1. Introduction
Forest resources belong to vital determining resources of the planet, because, in addition to economic value, they, together with fresh water reserves, are of great strategic importance in maintaining acceptable living conditions on Earth. Also, they have a very wide range of environmental and social functions. This determines the priority of solving the problems of using and restoring forest potential on a planetary scale, in individual countries, regions, and settlements. The need for this is reinforced by negative changes in climatic conditions and unsustainable forestry activities. Therefore, there is no alternative to the organization of rational forest management, and this requires efficient and competent management of forest resources by qualified personnel [1].

Rational management of forest resources is seen precisely in ensuring the process of their thoughtful circulation in compliance with certain conditions. This implies organizing the use of forest resources with the widespread implementation of the achievements of various fields of science and balanced timely management decisions to create an optimal environment for rational forest management, in which the main advantage of the forest, as the main means of production, is manifested, and it becomes inexhaustible with appropriate methods of operation. This feature is the basis of rational forest management. The effectiveness of managerial influence on the formation of sustainable forest management largely depends on the personnel potential, which mainly creates the conditions for these processes [2]. Their thought-out organization is based on the continuous...
systematic recording of business operations and analytical assessment of the processes and results of enterprises activities, being a prerequisite for effective management [3].

The development of forestry activities should be based on modern organizational and economic support for forest management using a set of levers of government and public participation. The inadequate material and technical base (or lack thereof), the imperfection of infrastructure support, the lack of motivation for improvement, and outdated approaches to conducting business activities by forestry enterprises do not take into account the factor of competition and full participation in market relations.

In the context of the active implementation of globalization processes, the interaction of countries and regions, as well as the facilitated exchange of resources and experience between them, a competitive development paradigm has been formed and is developing. It destroys the traditional stereotypes of forest management and requires the intensification, optimization, diversification of forestry, especially concerning the management system and personnel training [4]. The implementation of this paradigm, taking into account the conditions of sustainable forest management in Vietnam, requires some decisions and reforms both at the national and regional levels. Besides, it defines the goals, objectives, principles of organization, as well as priority areas for improving the theory and practice of professional training for this sector of the economy, taking into account modern socio-economic realities and using digital training methods [5].

There is not enough experience in creating and applying development mechanisms through the training of qualified management personnel, which determined the relevance of the research theme. The digital training methods are used quite rarely for training personnel in the field of forest management in Vietnam. That’s why it is very important to analyze nowadays situation and to suggest ways how to use such methods in personnel training.

2. Methods and Materials

The theoretical and methodological basis of the study is fundamental provisions of general economic theory, scientific works of domestic and foreign scientists and specialists in forest management and the influence of using digital training methods for personnel training. When solving research problems, the following methods were used: theoretical generalization; statistical analysis; graphical method; interviews of the managers in the forest sector and forest owners; synthesis method.

In the first stage of the investigation the situation in the Vietnamese forest management system was examined. The Vietnamese government believes that forest resources are the "backbone" of a national nature conservation strategy. They cover 164 sites that extend through terrestrial forests, wetlands and marine habitats. Forest resources are further divided into five categories that are designed to provide different levels of protection for over 50 years. First, national parks serve to protect ecosystems that hold high values for science, education and tourism. Secondly, nature reserves are wilderness areas designed to support environmental processes through the restoration of natural resources and biodiversity. Thirdly, there are species and habitats of the endemic or valuable flora and / or fauna. Fourth, there are protected natural areas that preserve natural and cultural sites with high aesthetic value. Fifthly, scientific forests are specifically designed to protect sites used for scientific research. [6]. Despite the diversity of forest resources and the fact that they currently cover a large area of the national territory of Vietnam, biodiversity and forest density continue to decline. According to the Ministry of Natural Resources and the Environment, there are more than 882 threatened species in Vietnam, compared with 161 in 2018 [7]. The reasons for this loss of biodiversity are varied. By 2019, 1 million hectares of fast-growing mono-cultural plantations, such as rubber, acacia, eucalyptus and pine, began to be classed as forest resources. Besides, up to 80% of the territories are inhabited either by communities that had historical claims to this land, or by those who invaded these territories. The government's failure to organize effective forest management has led to unsuccessful supervision and control of resources, as well as conflict with forest-dependent local communities living in and around forests.
The forests of Vietnam are rich in resources and retain rich biological diversity, including many endemic species. Vietnam's forest ecosystems can be divided into the following groups [8]:

1) tropical evergreen forests with dense vegetation and rich biodiversity;
2) evergreen forests in the limestone mountains, which contain the characteristic local flora of northern Vietnam and southern China;
3) deciduous forests suffering from a long dry season, in which dipterocarp plant species predominate;
4) mangrove forests along the coast;
5) tropical rainforests in mountainous areas with high rainfall but with a dry period of 1 to 3 months;
6) natural coniferous forests in mountainous areas;
7) Melaukai forests in areas with frequent wetlands, mainly in the Mekong Delta;
8) bamboo forests.

Forest resources of Vietnam are divided into three main categories [9, 10]:

1) special purpose forests (16%), mainly protected areas, such as national parks and nature protection zones (figure 1);
2) forest protection forests (34%), mainly for the protection of water sources, soils and the environment;
3) productive forests (50%), including both natural forests and forest plantations.

According to the National Forest Inventory Report VNFOREST (2017) there are about 14.4 million hectares of forest land in Vietnam, which is 41.2% of the total land area. About 10.2 million hectares are natural forests, and about 4.2 million hectares are forest plantations [10].

In response to a sharp decrease in forest cover, the Vietnamese government began experimenting with forest ownership reforms. In 1991, the first Law on the Protection and Development of Forests was adopted, which provided the legal basis for the distribution of forests between government bodies, individual citizens and rural communities. In 1993, a new land law was passed allowing renewable long-term (usually 50 years or more) forest use rights. The right holder was granted five basic property rights: exchange, transfer, inheritance, mortgage and lease of the allocated forest [11]. These two laws and related decrees provided a favorable environment for the emergence of new forest management mechanisms through both the distribution of forests and the conclusion of agreements to protect forests. The transfer of ownership of forest resources to individual households and, to a much lesser extent, entire rural communities, was achieved through the nationwide Forest Land Allocation Program (FLA) or “socialization”, which formed the basis for experiments with the Community Forest Management concept (CFM). The CFM concept was officially recognized in Vietnam for the first time since the implementation of the Law on the Protection and Development of Forests (2004).
However, before that, the Vietnamese government had been promoting CFM for several decades, especially on such issues as [12, 13]:

1) the process of allocating forest land to households and household groups (especially the poor, ethnic minorities whose livelihoods are closely linked to traditional forest management);
2) decentralization of forest management;
3) development of mechanisms for the poor, aimed at innovative solutions for forest management.

Vietnam Forestry Development Strategy (VFDS) for 2006-2020 includes the implementation of the CFM concept among the 20 key priorities for the forest sector, setting targets of 2.5 million hectares under CFM by 2010 and 4 million hectares by 2020.

Simultaneously with these reforms, the volume of financial support for the CFM from international organizations has been increased since the mid-1990s. Several programs have been implemented, including the funded Social Forestry Development Project (SFDP) in Son La and Lai Chau Provinces; financing of "Sustainable Development of Natural Resources and Rural Development" project in Dak Lak Province; UNDP Forest Program in Tua Thien Hue and Agricultural and Rural Development Cooperation (CARD) in Bak Kan Province. This period of international support for the CFM led to legal recognition of the CFM status in the Forest Protection and Development Act (2004) [14].

This was followed by a CFM pilot project implemented within the framework of MARD, funded by the Trust Fund for Forests (TFF), a multilateral project fund led by MARD. This project, which was implemented from 2006 to 2009, was aimed at developing an integrated approach to the CFM, combining land use planning, FLA, benefit-sharing mechanisms, forest management systems and financial management in a single agreed model. The final evaluation of this project confirmed that nearly 17,000 hectares of forest were allocated to 64 communities in 38 communes in 10 provinces across the country [10].

At present, Vietnamese forest areas are 77% state-owned, 22% are privately owned, and the remaining 1% belong to another owners: 21.7% are managed by Communal People’s Committees (PC), 14.2% - by special forest management tips, 20.8 % - by forest protection tips, 20.4% - by households, 7.8% - by communities, 11.2% - by state forest enterprises, 1.9% - by private enterprises, 1.3% - by army forces, 0.1% - by enterprises with foreign direct investment and 0.6% - by other organizations [10]. Elements of Vietnam's forest management system and their characteristics are presented in table 1.

Table 1. Elements of Vietnam's forest management system and their characteristics [15, 16].

| A group of forest users | The main types of forests | Natural forest (ha) | Forest plantation (ha) | Total forest area (ha) |
|-------------------------|---------------------------|---------------------|------------------------|------------------------|
| General management      | Special purpose forest management, use and protection of forests | 3818178 | 499774 | 4318492 |
| State Forest Companies  | Forest protection and production | 155473 | 492779 | 2044252 |
| Other business entities | Forest protection and production | 27219 | 64318 | 91537 |
| Army                    | Forest protection           | 196027 | 47661 | 243689 |
| Households              | Mostly low-quality industrial forest | 1961517 | 1325553 | 3287070 |
| Communities             | Mainly industrial forest; some protective forest | 171395 | 19989 | 191383 |
Other organizations

| Other organizations       | Forest protection and production | 575378 | 84556 | 659935 |
|--------------------------|----------------------------------|--------|-------|--------|

Communal People’s Committees

| Communal People’s Committees | Mostly industrial forest in remote areas | 2037578 | 384907 | 2422485 |
|-----------------------------|----------------------------------------|---------|--------|---------|

State-owned forest companies are the main owners who manage industrial forests in Vietnam. In the early 90s of the Doi moi era (market reform policy), these companies played an important role in the forest sector and influenced the livelihoods of millions of people living in these areas. However, due to the orientation of these companies towards natural logging, the forest resources managed by them are reduced both in area and in quality. Unsustainable forest management should be a serious problem. To date, no type of natural forest management in Vietnam is recognized as functioning following the principles of sustainable forest management.

In the second stage of the investigation the situation with the training of personnel in the forest sector of Vietnam was analyzed. Statistical information analyses, feedbacks of the participants in the training programs, the results of the interviews of the managers in the forest sector and analysis of the system of training personnel of the forest-related companies were used for this. Special attention was given to the analysis of using of digital training methods in the educational process for training of personnel in the forest sector in Vietnam.

3. Results and discussion

During the investigation about the training of personnel for the implementation of sustainable forest management in Vietnam firstly the analysis of strengths and weaknesses, opportunities and threats of the forest management system was carried out (table 2).

Table 2. SWOT analysis of strengths and weaknesses, opportunities and threats of the forest management system [15, 16].

| STRENGTHS | WEAKNESSES |
|-----------|------------|
| Internal factors | - Large natural forests, most forests are rich and medium-sized forests. | - Weak personnel training in the forest management system. |
| | - Long-standing traditional practices and forest management practices. | - Lack of environmental awareness. |
| | - Systematic and long-term stability in the production and maintenance of forestry. | - Lack of activity in the sphere of finance and human resources. |

| OPPORTUNITIES | THREATS |
|---------------|---------|
| External factors | - Strict provincial forestry policies | - Land-use conflicts with local communities. |
| | - Fast revenues for the state from logging. | - Exclusion of community participation in operations. |
| | - Maintaining the environmental situation and welfare for human settlements. | - Weak performance monitoring and evaluation system. |
| | - Openness to the future reform. | - Slow changes in terms of awareness and behavior of both staff and participants in the forest management process. |

Based on such analyses it was made a list of problems in forest management in Vietnam which can be solved based on training. Among the most important questions are: 1. How to increase environmental awareness. 2. How to raise the effectiveness of forest management. 3. How to attract...
investments into the forest sector in Vietnam. 4. How to organize more effective environmental protection. 5. How to organize better functioning of monitoring and evaluation systems in the forest sector in Vietnam. 6. How to speed up the changes in the behavior of staff and participants in the forest management process. The conclusion was made that all of these problems can be solved by effectively organized education for the managers who are working in the Vietnamese forest sector.

The existing approaches for training of personnel in the frame of sustainable forest management in Vietnam were also examined. It was concluded that there is a lack of personnel training in forest management in Vietnam. The situation with using digital methods of education in the forest sector is even worth it. Especially it concerns far off regions.

Based on the interviews with the managers from the forest sector it may be concluded that the use of digital methods for education in the sphere of sustainable forest management is supported by them. More than 80% of the interview participants would like to participate in such educational programs. The reasons for including digital methods in education are: an opportunity to study from home, the opportunity to use more effectively time, opportunity to be not dependent on the place of education. Another very important reason that was mentioned is that such education can be more cost-effective because the participants in the training program from far off regions do not need to come to the central cities or regional cities to study and can save money by not having to pay for transportation and per diem costs.

But there are also obstacles to the implementation of digital methods of training personnel in Vietnam, by the opinion of the participants of interviews. One of the very important obstacles is the lack of experience in using computers of some specialists working in the forest sector in Vietnam. The other obstacle is that some of the representatives of the forest sector do not understand the need for education for the development of a sustainable forest sector in Vietnam. Especially this was stressed by individual forest owners.

A very important question concerns the organizations which offer online courses for the representatives of the forest sector in Vietnam. The creation of the on-line courses for effective forest management is nowadays organized in high educational institutions in the frame of different approaches: training of students, international projects, organizing continuous training for the personnel in the companies. The digitalization of education in forest management is implemented in traditional education in high educational institutions and professional education. But if the results of such work can be compared with the development of digitalization in other spheres, it can be concluded that the development of digital training methods in forest management is not so quick, as in other spheres. In other sectors in education the incomes from on-line education in Vietnam is now much more than from contact education. So, the development of digital forms of education in the forest sector may raise the effectiveness of education from qualitative and quantitative points of view.

Concerns the main themes of education that can be implemented in the online courses the respondents mentioned such as best foreign practices in sustainable development in forest management, economical efficiency of forest management, forest certification, market-based instruments for incentives through payment for environmental services, logging methods with reduced environmental impact, multi-level planning, small and medium-sized enterprises development in the forest sector and biodiversity conservation. Of course, there is a big need for IT education for all groups of forest owners. The necessity for such education was stressed in all interviews of the respondents.

Thus, the development of digital methods in training of highly qualified personnel for the forest management system to raise the effectiveness of sustainable forest management is very important nowadays and it should be supported by the forest companies and governmental structures.

4. Conclusions
Analysis of the nowadays situation in forest management in Vietnam leads to the conclusion that there are a lot of problems with its realization. One of the main problems is not enough capacity to provide approaches to forest ownership distribution, and to assess and plan community forests. Besides, the
benefit-sharing policy for land recipients is not clear and therefore not feasible, and the administrative procurement procedures that have historically been applied to state forest enterprises are too complex for the context of community forest management. This is largely due to the obvious paradox associated with joint management in centralized states, which, on the one hand, take steps to formalize cooperation with resource users, but, on the other hand, are less willing to decentralize and transfer decision-making both within the state and non-state on actors to facilitate more adaptive decision making. Although the preparation of regulatory and technical guidelines was considered relatively successful, some limitations of the forest management system were identified:

- Low level of awareness among villagers about the concept and potential of the CFM.
- Skepticism in local government regarding the ability of communities to effectively manage forests.
- Not enough time to fully test the model, document experience, and adopt best practices.
- Overly sophisticated technical guides, procedures, and rules.
- Focusing on wood production, which leads to the reduction in forest resources and neglects their importance in rural life.

The development of digital training methods for training personnel in forest management in Vietnam nowadays can be estimated as not sufficient. There are not so many opportunities for forest owners or persons who are working in the forest sector to study using on-line courses. But there is a real desire for using such opportunities in the training of personnel in the forest sector in Vietnam. The high educational institutions are ready to participate in the organizing such education for all stakeholders. The use of digital methods in the training of personnel in the forest management process has faced serious challenges. The most important challenge is not so high qualification of the personnel in using computers. So, it will be essential to make governmental support for the education in the basics of IT for the forest sector representatives.

A very important direction in the development of digital methods in forest education is the creation of educational programs [17]. The content of educational programs may be based on the main problems that were investigated during the analysis of the nowadays situation in forest management in Vietnam. The most urgent themes that should be included in the educational process are: raising the effectiveness of forest management, basics of investments and how to attract investments to the forest sector in Vietnam, effective environmental protection, etc. The educational courses should speed up the changes in the behavior of staff and participants in the forest management process.

Summarizing the above, it can be noted that one of the directions of improving the forest management system in Vietnam is the training of competent personnel. The government should establish a system of forest education in the frame of three types of forestry schools. It can be suggested that such types of forestry schools need to be organized in Vietnam: schools of the first type should provide mainly short-term training aimed at understanding by students the general essence of the forest as a source of various resources and the development of skills for a wide range of practical forestry activities; schools of the second type should provide professional education for administrative and managerial activities in the field of forestry, and finally, schools of the third type should provide training for highly qualified specialists and a young generation of scientists in the field of forest management. The schools should use modern teaching methods for training personnel in the forest sector of Vietnam. The most important innovational teaching nowadays is using digital training methods, that's why special attention should be paid for more active use of them in the training of personnel in the forest sector in Vietnam.

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