ISSN 1997-9347

Components of Scientific and Technological Progress

SCIENTIFIC AND PRACTICAL JOURNAL

№ 10(52) 2020

Paphos, Cyprus, 2020

Journal "Components of Scientific and Technological Progress" is published 12 times a year

Founder
Development Fund for Science and Culture
Scientific news of Cyprus LTD

The journal "Components of Scientific and Technological Progress" is included in the list of HAC leading peer-reviewed scientific journals and publications in which the main scientific results of the dissertation for the degree of doctor and candidate of sciences should be published

Chief editor
Vyacheslav Tyutyunnik

Page planner:
Marina Karina

Copy editor:
Natalia Gunina

Director of public relations:
Ellada Karakasidou

Postal address:
1. In Cyprus:
8046 Atalanta court, 302
Papthos, Cyprus
2. In Russia:
13 Shpalernaya St,
St. Petersburg, Russia

Contact phone:
(+357)99-740-463
8(915)678-88-44

E-mail:
tmbprint@mail.ru

Subscription index of Agency **"Rospechat"** No 70728 for periodicals.

Information about published articles is regularly provided to **Russian Science Citation Index** (Contract No 124-04/2011R).

Website:
http://moofrnk.com/

ADVISORY COUNCIL

and Psychology of the Moscow Social and Pedagogical Institute; tel.: 8(495)6074186, 8(495)6074513; E-mail: dekanmospi@mail.ru, Moscow (Russia)

Petrenko Sergey Vladimirovich – Doctor of Technical Sciences, Professor, Head of Department of Mathematical Methods in Economics, Lipetsk State Pedagogical University, tel.: 8(4742)328436, 8(4742)221983, E-mail: viola@lipetsk.ru, viola349650@yandex.ru, Lipetsk (Russia)

Tarando Elena Evgenievna – Doctor of Economics, Professor of the Department of Economic Sociology, St. Petersburg State University, tel.: 8(812)2749706, E-mail: elena.tarando@mail.ru, St. Petersburg (Russia)

Veress József – PhD, Researcher in Information Systems Department, Business School of Corvinus University, tel.: 36 303206350, 36 1 482 742; E-mail: jozsef.veress@uni-corvinus.hu, Budapest (Hungary)

Kochetkova Alexandra Igorevna – Doctor of Philosophy and Cultural Studies (degree in organizational development and organizational behavior), PhD, Professor, Department of General and Strategic Management Institute of Business Administration of the Russian Academy of National Economy and Public Administration under the President of the Russian Federation, E-mail: dak6966@gmail.com, Moscow (Russia)

Bolshakov Sergey Nikolaevich – Doctor of Political Sciences, Doctor of Economics, Vice-Rector for Academic Affairs, Professor, Syktyvkar State University named after Pitirim Sorokin, tel.: 8(921)6334832, E-mail: snbolshakov@mail.ru, Syktyvkar (Russia)

Gocłowska-Bolek Joanna – Center for Political Analysis, University of Warsaw, tel. 48691445777, E-mail: j.goclowska-bolek@uw.edu.pl, Warsaw (Poland)

Karakasidou Ellada – A&G, Kotanides LTD, Logistic, tel.: +99346270, E-mail: espavoellada9@gmail.com, Paphos (Cyprus)

Artyukh Angelika Alexandrovna – Doctor of Art History, Professor of the Department of Dramatic and Cinema Studies, St. Petersburg State University of Cinema and Television; tel.: +7(911)9250031; E-mail: s-melnikova@list.ru, St. Petersburg (Russia)

Melnikova Svetlana Ivanovna – Doctor of Art History, Professor, Head of the Department of Dramatic Art and Cinema Studies at the Screen Arts Institute of St. Petersburg State University of Cinema and Television; tel.: +7(911)9250031; E-mail: s-melnikova@list.ru, St. Petersburg (Russia)

Marijan Cingula – Tenured Professor, University of Zagreb, Faculty of Economics and Business, tel.: +385(95)1998925, E-mail: mcingula@efzg.hr, Zagreb (Croatia)

Pukharenko Yury Vladimirovich – Doctor of Technical Sciences, Professor, Head of the Department of Building Materials Technology and Metrology at St. Petersburg State University of Architecture and Civil Engineering, Corresponding Member of the Russian Academy of Architecture and Construction Sciences; tel.: +7(921)3245908; E-mail: tsik@spbgasu.ru, St. Petersburg (Russia)

Przygoda Miroslaw – Dr. hab., Head of Institute of Economic Analysis and Planning, Department of Management, University of Warsaw, tel.: 225534167, E-mail: miroslawprzygoda@wp.pl, Warsaw (Poland)

Recker Nicholas – PhD, Associate Professor, Metropolitan State University of Denver, tel.: 3035563167, E-mail: nrecker@msudenver.edu, Denver (USA)

Contents

Содержание

UDK 624

The Comparative Analysis of Different Types of Insulations in Sandwich Panels for Building Construction with Metal Frame

A.M. Bozhenko, M.A. Shevtsova, T.K. Albutova

Far Eastern Federal University,
Vladivostok (Russia)

Key words and phrases: mineral wool; expanded polystyrene; polyurethane foam; sandwich panel; thermal insulation material; thermal conductivity; weighting agent.

Abstract. This article discusses the various types of insulation used for sandwich panels, such as mineral wool, expanded polystyrene and polyurethane foam. The main properties and characteristics of the selected heat-insulating materials are analyzed. A comparative analysis of the physical characteristics of heaters is given, their advantages and disadvantages are evaluated. In conclusion, the best heat-insulating material for enclosing structures made of sandwich panels was identified. As a result of careful analysis, polyurethane foam was chosen as the most recommended insulation.

Sandwich panels are one of the most common and widely used building materials. They can be used for both walls and roofs. Often, sandwich panels are used in the construction of quickly erected buildings, the main factors for the installation of which are the speed of construction, long period of exploitation and low cost.

Sandwich panels are a three-layer structures, where the inner layer is the thermal-insulating material. Insulation of sandwich panels retains the warmth of the room, providing the optimal microclimate. In addition, thermal insulation prevents the metal structures of the frame from freezing in winter. In this article we have researched the following types of thermal insulation.

Mineral wool is a fibrous material that is obtained from rock melts, as well as metallurgical slags and their mixtures. If rocks are used as a raw material, mineral wool has high quality and its exploitation is quite long. First of all, this material has a high thermal resistance, that allows to keep heat inside the room for a long time and saves money on heating the buildings in winter. The thermal conductivity coefficient is 0.036 W/m*K [1]. The incombustibility of mineral wool is achieved due to the use of non-combustible silicate rock melts in the production. Even at the high temperature the mineral wool boards have no deformation and all properties are preserved. The material resists the spread of fire, that is why mineral wool is used for insulating rooms where people store different flammable substances. In addition to their direct functions sandwich panels with mineral insulation absorb noise perfectly. In comparison with other materials, sandwich panels with mineral wool insulation are quite heavy, therefore, they increase

Table 1. The main characteristics of thermal insulation materials

Materials	Mineral wool	Expanded styrofoam	Polyurethane foam
Conductivity coefficient, W/m*K	0.36–0.44	0.028–0.034	0.023–0.032
Soundproofing	good	not good	good
Environmental friendliness	eco-friendly	not eco-friendly	eco-friendly
Lightness, kg/m^2	35–100	20–50	60
Flammability	G0	G3–G4	G3–G4
Price for 1 m^2	1,550 RUB	1,300 RUB	750 RUB

the load on the building structure. The cost of this material depends on what is more important for customer: economy or appearance. If the material has a complex texture, then the price for this type of sandwich panel will be more expensive. As for environmental friendliness, mineral wool is absolutely safe and harmless for humans and the environment. The strength of mineral wool depends on the direction of the fibers, and the ideal choice is a material with randomly directed fibers.

The next thermal insulation material used in three is layer sandwich panels is expanded styrofoam. Due to the fact that the composition of expanded styrofoam consists of 98 % air, this material has a low coefficient of thermal conductivity equal to 0.028–0.034 W/m*K. In addition to the low value of thermal conductivity, expanded polystyrene boasts high strength and relatively inexpensive cost. The light weight of the structures makes it easier to install sandwich panels. Due to the isolated air cells inside the material, styrofoam is not able to prevent the spread of air noise, at best, to muffle shock noise. The main disadvantages of using expanded styrofoam include its combustibility, it belongs to the group G3 and G4 – the most dangerous [GOST 30244]. Despite the manufacturers, assurances that the addition of antipyrene will correct this significant drawback, in fact, Styrofoam with fire retardant burns as well as without its addition. The only difference is that it lights up much worse. In addition, this material can emit volatile compounds that are dangerous to human health when heated.

Another option for thermal insulation for sandwich panels is polyurethane foam. This building material is a type of gas-filled plastic. Just like Styrofoam, this material has a thermal conductivity of 0.023–0.032 W/m*K. This material is not subject to deformation, rot and decomposition, and is resistant to the effects of alkalis and acids. Unlike Styrofoam, polyurethane foam is completely non-toxic and is considered environmentally friendly. The average service life of such panels is 30 years, thanks to the microporous structure, polyurethane foam is an excellent noise-insulating material. The light weight of the structures reduces the load on the Foundation. The main disadvantage of polyurethane foam as well as Styrofoam is an insufficient level of fire resistance (the degree of combustibility G3–G4), adding antipyrene will not fix the problem, but will exclude the possibility of self-ignition, the material will melt only with an open flame. Another disadvantage of polyurethane foam is its instability to ultraviolet radiation, but this disadvantage is not relevant in a three – layer sandwich panel.

The main characteristics of thermal insulation materials are presented in the Table 1.

In conclusion, we can say that the best thermal insulation for a three-layer sandwich panel is polyurethane foam. It is perfect for the construction of buildings that do not require a high level of fire protection. The use of this material will provide a building with a high level of heat

and sound insulation, reduce the load on the foundation, and will not emit toxic substances during operation. The price of expanded polystyrene boards is much lower than for mineral wool boards.

If requirements for fire safety on the construction object are imposed, mineral wool should be the best variant for thermal insulation. This material is the best in this area, despite the fact that its coefficient of thermal conductivity is lower than polyurethane foam's, it absorbs external noise and is resistant to decay and mold. The high cost is the problem that can be mitigated by ordering materials directly from the manufacturer.

References

1. SP 50.13330.2012. Teplovaya zashchita zdaniy. Aktualizirovannaya redaktsiya SNiP 23-02-2003 (s Izmeneniem N 1).

2. SP 51.13330.2011. Zashchita ot shuma. Aktualizirovannaya redaktsiya SNiP 23-03-2003 (s Izmeneniyami N 1).

3. GOST 30244-94. Materialy stroitelnye. Metody ispytaniy na goryuchest.

4. Zakharov, A.V. Energoeffektivnye konstruktsii v stroitelstve : ucheb. posobie / A.V. Zakharov, E.N. Sychkina, A.B. Ponomarev. – Perm : Izd-vo Permskogo natsionalnogo issledovatelskogo politekhnicheskogo universiteta, 2017.

Сравнительный анализ различных типов утеплителей, применяемых в сэндвич-панелях при строительстве зданий с металлическим каркасом

А.М. Боженко, М.А. Шевцова, Т.К. Албутова

ФГАОУ ВО «Дальневосточный федеральный университет», г. Владивосток (Россия)

Ключевые слова и фразы: минеральная вата; пенополистирол; пенополиуретан; сэндвич-панель; теплоизоляционный материал; теплопроводность; утеплитель.

Аннотация. В данной статье рассмотрены различные типы утеплителей, используемых для сэндвич-панелей, такие как минеральная вата, пенополистирол и пенополиуретан. Проанализированы основные свойства и характеристики выбранных теплоизоляционных материалов. Приведен сравнительный анализ физических характеристик утеплителей, оценены их преимущества и недостатки. В заключение выявлен лучший теплоизолирующий материал для ограждающих конструкций из сэндвич-панелей. В результате тщательного анализа наиболее рекомендуемым утеплителем был выбран пенополиуретан.

UDK 620.9

The Analysis Environmentally-Friendly Residential Buildings with Mongolian Characteristics and Mongolian Yurts

Wang Long, Ya-quan Xie, Gui-fang Fan

Inner Mongolia Autonomous Region People's University, Tongliao (China);
Bureau of Housing and Urban-Rural Development, Otog-Qianqi (China);
Inner Mongolia University of Technology, Hohhot (China)

Key words and phrases: literary review; construction technologies; modern construction methods; prefabricated light steel structures; Mongolian yurts.

Abstract. An overview of studies on new thin-walled light steel prefabricated buildings that combine the advantages of prefabricated houses and Mongolian yurts is presented. Publications from various databases, including PubMed, Science Direct, Wiley Online Library, Wanfang Data, Web of Science, were used by searching for the keywords "Mongolian yurts" and "prefabricated houses" between 1998 and 2020. Comparison of prefabricated houses and Mongolian yurts revealed that prefabricated houses and Mongolian yurts have many characteristics in common in terms of construction, installation and transportation. This similarity is a good basis for combining the concepts of prefabricated houses and yurts. Lightweight steel prefabricated yurts have the following characteristics in terms of green building and energy saving principles: building materials are environmentally friendly and can be recycled without generating permanent construction waste, which significantly reduces the frequency of building maintenance and replacement of its components. The use of prefabricated light steel yurts does not require ventilation, heating and other equipment. Mongolian yurts have traditionally been the habitat of shepherds. Modified and designed in the form of light steel prefab houses, they can provide new living and running opportunities for catering and tourism for residents in agricultural and grazing areas.

Introduction

In recent years, living conditions of farmers and herdsmen in Inner Mongolia have greatly improved due to the economic development and the large investments made by the government

for constructions in these rural regions [1, p. 23]. Nevertheless, housing improvements in rural pastoral areas have been slow due to the limitations posed by geographical conditions, design concepts, and the availability of capital [1, p. 24]. It is therefore necessary to explore new technologies to improve housing conditions in these areas [2]. Prefabricated homes refer to residential buildings assembled by reliable connections of prefabricated components [3, p. 227]. The advantages of these buildings include low energy consumption, clean fabrication; they are highly customizable and mass-producible, based on user and environmental demands. Additionally, prefabricated buildings feature high construction speeds and production efficiencies, which result in economic, social, and environmental benefits, thus making their development a new trend in the construction industry. In contrast, rural pastoral areas in Inner Mongolia have been developing quite slowly with increasing energy demands. However, a large number of financial investments and resources have been devoted to these areas by China to help meet the basic requirements of life and production, for herdsmen in the region. As the economy of rural pastoral areas and the standard of living improve, the residents of these areas seek a better lifestyle. The economical and environmentally friendly prefabricated Mongolian yurts offer a novel way of addressing these issues.

Correlation between prefabricated buildings and Mongolian yurts

The origin of Mongolian yurt

Two thousand years ago, the residences of the Huns were called yurts (the initial prototype of Mongolian yurts) [4, p. 17]. Over the past several centuries, Mongolian people have been exploring and reforming their habitation to best suit their lifestyle and work, eventually choosing common building materials such as timber and felt, to build unique Mongolian yurts. The fact that Mongolian yurts have been retained by Mongolian people to this day not only symbolizes their customs and culture but also signifies the rationality of their building technique for the reasons mentioned below.

Analysis of building structures

The Mongolian yurt considered for this consists of a wooden structure, a straw mat system, and a rope system. Cement, adobe, and tile were not necessary for construction and the only raw materials used were wood and fur. The single-story light steel prefabricated building consists of load-bearing and non-load-bearing structures. It was found that the wooden structure of the Mongolian yurt corresponds to the load-bearing structures of the light steel prefabricated building, while the straw mat and rope systems correspond to the non-load-bearing structures [5, p. 6].

A comparison of the roof of a Mongolian yurt and the ridge pole and roof plate of a light steel prefabricated building

The roof of a Mongolian yurt, which is made of the Taonao and Wuni, corresponds to the ridge pole and roof plate of a sloping roof structure system in a light steel prefabricated building. The load-bearing structure of a single-story light steel prefabricated building includes a ridge pole, roof plate, wallboard, and floor. The ridge pole is often made of a universal beam with its length being determined by the size of the bay, and two ridge poles of the same size are placed side by side in a bay. The ridge poles of a small-scale light steel prefabricated building can be

set up with gables at both ends, and a bearing pillar can be built in the middle of gables when the roof load is large so that the ridge poles can be set up on the pillar. The same method applies for a Mongolian yurt; when a Mongolian yurt bears too much load or self-weight, the self-weight and wind load bends part of the Taonao and reduces its stability. Hence, when a Mongolian yurt is larger than eight Hana, two or more pillars should be added below the Taonao to ensure the stability of the Taonao. This flexible load-bearing design may only apply to Mongolian yurts and single-story light steel prefabricated buildings. Additionally, ventilation and lighting are two features that the Taonao has but are lacking in the ridge poles. Currently, ventilation and lighting in light steel prefabricated buildings can only be achieved by installing windows in the wallboard or roof plate. Thus, the versatility of the Taonao is an inspiration for the development of the design of single-story light steel prefabricated buildings.

The roof plate of a light steel prefabricated building is usually assembled with a thin-walled light steel framework, and is filled with soundproof and fireproof cotton, and bound by panels on two sides. The top of a roof plate is hinged with ridge poles and the bottom is hinged with a wall or ring beam [6, p. 56]. In most cases, the size of the roof plate is determined by the roof to ensure that it is following the dimensions of other parts. This is similar to the Aoni that has a concordant length and thickness that is favorable for its manufacture and installation.

Comparison between the Hana of a Mongolian yurt and the wallboard of a light steel prefabricated building

The Hana serves as the wallboard of a Mongolian yurt and corresponds to the wallboard of a light steel prefabricated building. A Hana is made of red willow sticks of the same length and thickness. The sticks are arranged crosswise at the same intervals and fastened at each intersection by leather nails, thus becoming a flexible wooden component consisting of many parallelograms [7, p. 217]. The role of Hana corresponds to the wall panels of light steel prefabricated buildings. The roof plate of a light steel prefabricated building is usually assembled using a thin-walled light steel framework, which is filled by soundproof and fireproof cotton and is bound by panels on either side. Similar to the design of the roof plate, the wallboard must have the same standards for the ease of manufacturing and assembly. Both Hana and prefabricated wallboard are important load-bearing components and are at the core of the overall stability of the building. Also, both Hana and prefabricated wallboards satisfy the need for interior decoration: the Hana has uniform diamond patterns for interior decoration and does not require further decoration inside of a Mongolian yurt; by comparison, a decorative panel is assembled on the interior surface of prefabricated wallboards of the same size, with uniform and orderly decorative lines. Both Hana and prefabricated wallboards are remarkably similar in terms of structure and decoration.

Comparison of the mat and rope systems of a Mongolian yurt and a non-load bearing structural system of a light steel prefabricated building

The mat in a Mongolian yurt corresponds to supporting wood. The covering on a Taonao is called Mengzhan, the covering on a Wuni is called Dingpeng, and the covering on a Hana is called Weizhan [8, p. 133]. A straw mat is used as a covering on top of the supporting wood of a Mongolian yurt, which serves as a protective and decorative layer for the supporting wood system. The binding rope, pressure rope, tie rope, and pending rope of a Mongolian yurt are

used to maintain the shape of a Mongolian yurt and prevent it from bulging, hold the ceiling in place, and prevent the Weizhan from falling or being blown away by the wind. If the Wuni and Hana of a Mongolian yurt are regarded as the thin-walled light steel framework of a light steel prefabricated building, the yurt mat system can be regarded as the building slab nailed to the framework of the roof plate and the wallboard. The rope system can be regarded as nails that connect the mat with the Wuni and Hana, and the binding rope is similar to the ring beam of a light steel prefabricated building. The roof plate and wallboard of a light steel prefabricated building are assembled with a thin-walled light steel framework. Users can decide how to manage their framework. For example, thermal insulation and flame-retardant material can be used to fill the inner side of the framework, insulation board, and fireproof board. Indoor and outdoor decorative panels can also be nailed on the framework. Also, various materials, patterns, and colors may be used for the construction of these buildings. This is similar to changes made by herdsmen on the mat system: they add, reduce, or change the yurt mat according to the desired temperature in a Mongolian yurt.

Analysis of the installation

Installation order

The order of installation of a Mongolian yurt is as follows: setting up the floor, fixing the Hana, supporting the Taonao, and building the Wuni. After the main load-bearing components are set up and when there is no pillar in a Mongolian yurt, the laying of the inner mat, covering of the Hana mat, wrapping of the Dingchen mat, placing the Taozhan that covers the yurt top, tying the outer belt, binding the Weizhan at the bottom of the Hana, and fastening these components by rope, are completed. The outside decoration is completed later. After all these steps are completed, a Mongolian yurt is ready. The order of installation of a light steel prefabricated building is as follows: setting up the floor, installing the wallboard, installing the ridge pole, installing the roof plate, and installing the exterior decoration [9, p. 1589]. Comparing the installations of these two structures, it is not coincidental that a Mongolian yurt and a light steel prefabricated building have the same order of installation and construction, but in fact, a resonance of engineering wisdom. The building experience that the Mongolian people gained in the past five thousand years is still practical, reflecting not only the devotion of Mongolian people to their habitation but also the rationality of the building process.

Installation manner

The connections between the components of a Mongolian yurt are ensured by leather nails and mane ropes, and these joints are reusable. Most connections in a light steel prefabricated building are ensured by bolts with a few boards being bound together. For a light steel prefabricated building with a high degree of integration, all connections are done by bolts for the convenience of installation and removal. A comparison of the manner of installation of a Mongolian yurt and a light steel prefabricated building shows that they are similar and that both avoid the processing and manufacturing of any components and joints at the construction sites. However, a Mongolian yurt uses joints that are fabricated manually, and their degree of integration displays a considerable disparity with that of light steel joints. Also, the rigidity of the connections of leather nails and mane ropes is greater than that of light steel joints. These two features are important factors impacting structural stability.

Personnel

The assembly of a Mongolian yurt does not require professionals, and the cooperation between family members is adequate for its construction. For example, a Mongolian yurt with a diameter of 3–5 m requires two to three people to build it by hand, including the components like wallboard and Weizhan, or more than four people if the Mongolian yurt is a slightly larger, such as one with a diameter of 5 meters; the time required for the assembly is only two to four hours. The light steel prefabricated building also does not require any professional workers and family members can complete the assembly. This type of installation has been practiced in Shanghai, China, and Perth, Australia. For example, a rain shelter made from a single-story light steel prefabricated building with an area of 10 square meters with decorations (including doors and windows, modern furniture, and integrated kitchen and bathroom lighting) can be assembled by only three or four people within eight hours, and the rest of the decor can be done per the user's need and schedule.

Proposal of prefabricated Mongolian yurts

The fact that yurts have been inherited to the present day proves their success and rationality in terms of their building ideas and technique. In the prime of the development of construction technology, numerous building materials and techniques have become available that provide the opportunity of reforming the construction industry [10, p. 15]. Prefabricated buildings have become important for the reform and transformation of the Chinese construction industry and will be used within each field of the construction industry as a key technique.

The above analysis showed that Mongolian yurts and light steel prefabricated buildings share many common features in their structural system, installation, and transportation, which lay a good foundation for their combination. The differences between the construction materials and installation techniques, also provide several new ideas related to their combination. Therefore, a thin-walled light steel prefabricated Mongolian yurt may be a new construction form that draws on the features of both structures and fully reflects the lifestyle of herdsmen.

References

1. Wang, C. Key factors to promote the development of assembly residences / C. Wang // Housing Science. – 2016. – No. 38. – P. 23–26.

2. Sekiguchi, T. Moving from prefabricated temporary housing to public reconstruction housing and social isolation after the Great East Japan Earthquake: a longitudinal study using propensity score matching / T. Sekiguchi, Y. Hagiwara, Y. Sugawara, Y. Tomata, F. Tanji, Y. Yabe, E. Itoi, I. Tsuji // BMJ Open. – 2019. – No. 9(5).

3. Qu, S. Prefabricated steel structure building advantage analysis / S. Qu // Town house. – 2020. – No. 27. – P. 227–228.

4. Hong, S. Yurt – a symbolic symbol of nomadic folk culture / S. Hong // Journal Gansu Radio & TV University. – 2015. – No. 25.

5. Liu, Y. Aesthetic research on Mongolian yurts / Y. Liu; Minzu University of China. – Beijing, China, 2005.

6. Yuan, J. Mongolian yurts: Houses on wheels / J. Yuan // Shijian (Theory Edition). – 2019. – No. 4. – P. 56.

7. Gao, X. Architectural elements of traditional Mongolian yurts and its folk background /

X. Gao // Journal Inner Mongolia Agricultural University (Social Science Edition). – 2010. – No. 12. – P. 217–219.

8. Gao, J. Discussion on the ecological wisdom of traditional Mongolian decorative art / J. Gao // Arts Criticism. – 2017. – No. 08. – P. 131–134.

9. Xie, Y. Research on quality control in construction of continuously welded stainless-steel roof / Y. Xie // Architectural Engineering Technology and Design. – 2018. – No. 35. – P. 1589.

10. Ye, M. The development of new construction methods is a new requirement of the new era / M. Ye // Housing Industry. – 2019. – No. Z1. – P. 14–16.

Экологически чистые жилые постройки с монгольскими характеристиками и монгольские юрты

Ван Лонг, Се Яцюань, Фань Гуйфан

Народный университет автономного района Внутренняя Монголия, г. Тунляо (Китай);
Управление по строительству города и деревни, г. Отог-Цяньци (Китай);
Технологический университет Внутренней Монголии, г. Хух-Хото (Китай)

Ключевые слова и фразы: литературный обзор; строительные технологии; современные методы строительства; сборные конструкции из легкой стали; монгольские юрты.

Аннотация. Представлен обзор исследований, посвященных новым тонкостенным легким стальным сборным зданиям, сочетающим в себе преимущества сборных домов и монгольских юрт. Были использованы публикации из различных баз данных, включая PubMed, Science Direct, онлайн-библиотеки Wiley, Wanfang Data, Web of Science, посредством поиска по ключевым словам «монгольские юрты» и «сборные дома» в период с 1998 по 2020 гг. Сравнение сборных домов и монгольских юрт выявило, что сборные дома и монгольские юрты имеют много общих характеристик с точки зрения конструкции, монтажа и транспортировки. Это сходство является хорошей основой для объединения концепций сборных домов и юрт.

Легкие стальные сборные юрты с точки зрения принципов экологического строительства и энергосбережения имеют следующие характеристики: строительные материалы не наносят вреда окружающей среде и могут подвергаться вторичной переработке, не образуя постоянных строительных отходов, что значительно сокращает частоту технического обслуживания здания и замены его компонентов. Использование сборных юрт из легкой стали не требует вентиляционного, отопительного и другого оборудования. Монгольские юрты традиционно были местом обитания пастухов. После проектирования и модификации в форме сборных домов из легкой стали, они могут обеспечить новые возможности для жизни и организации деятельности предприятий общественного питания и туризма для жителей в сельскохозяйственных и пастбищных районах.

UDK 330.43

Computer Implementation of the Regression-Correlation Analysis of the Economic Process of Demand for Banking Services from the Territorial Perspective

V.A. Grishin

Dzerzhinsk Branch of Lobachevsky Nizhny Novgorod State University, Dzerzhinsk (Russia)

Key words and phrases: banking services; economic process; mode; regression-correlation analysis.

Abstract. The article presents a three-factor model for forecasting demand based on a regression-correlation analysis of the economic process of demand for banking services in the territorial aspect. A model based on many factors will make it possible to assess the attractiveness of each settlement, which implies a phased expansion of the network on the territory of the Russian Federation.

Introduction

At present, the strategically important task for the Russian economy is the development of its banking sector. It is the driving force for the revival of the economy, increasing the efficiency of investment, innovation, economic and social activities of our state. At the same time,forecasting of the banking services market plays a crucial role, identifying trends in its development under the influence of the following main factors: political, legal, economic conditions and business activity, inflationary, life cycle stages of banking products, pricing policy, competitive environment, etc. [1–10].

With the advent of the COVID-19 pandemic, the banking system of the Russian Federation, which was considered stable, was not ready to function in the new realities. Banks are forced to change their expansion and development strategy to survival strategies. Reducing administrative costs, banks, first of all, began to actively reduce the number of branches. Today, the trend of a rapid decline is changing to a gradual recovery and growth. Therefore, the banks faced the following problem – how to optimize their branch network so that it brings maximum profit, and to identify promising cities for opening new branches, because the times of thoughtless growth and expansion of the branch network are in the past.

In the domestic science, this direction of multivariate modeling has been insufficiently studied, although the number of publications on certain issues is increasing. Territorial aspects of the development of markets for goods and services using geographic methods disclosed in the work of scientists such as K. Babaritskaya (functional-territorial segmentation of touristic services), V. Balabanov (territorial segmentation of the food market), A.P. Golikov and

P.A. Chornomaz (spatial analysis of the sales market), etc. Therefore, the urgent task is to build a three-factor model of demand in the market environment based on regression-correlation analysis, corresponding to the realities of the post-industrial economy.

The purpose of the article is to study the computer implementation of the regression-correlation analysis of the economic process of demand for banking services in the territorial aspect.

Forecasting of banking services

Forecasting of the banking services market involves the following main stages [13–14]:

1) setting the forecast period;
2) selecting and analyzing the significant impact;
3) quantifying the influencing factors;
4) modeling development processes;
5) preparing the market forecast.

Forecasting is carried out using certain tools, among which the main ones can be considered:

– methods of expert assessments;
– normative methods;
– economic and mathematical methods;
– statistical methods.

The method of expert assessments can be used in case of insufficient statistical data, in the absence of quantitative methods for measuring an object, with time constraints, as well as for confirmation or comparison with forecasts obtained by other methods.

The disadvantages of the method of expert assessments are as follows:

– subjectivity of expert assessment;
– the possibility of error even by most experts;
– instability of expert assessments.

Individual and group expert surveys are applied.

Expert polls predict the following stages:

– selecting experts and forming expert groups;
– formulating tasks and preparing questionnaires;
– establishing rules for determining the total scores, taking into account the degree of competence of the expert;
– directing work with experts;
– analyzing and processing of expert assessments.

In order to increase the reliability of expert assessments and minimize the influence of subjective factors, the following methods can be used:

– carrying out group examinations, including by the method of “team-based idea generation”;
– repeated examinations;
– assessment of the competence of experts;
– examination in several rounds (Delphi method).

The essence of the normative forecasting method is to determine the future parameters of the banking services market based on the normative ratios between individual indicators, which can either be recorded in certain legal acts or actually be on the market.

Economic and mathematical methods are based on the calculation of market parameters using multivariate models and allow developing several forecast options with minimal time and resources.

Methods of forecasting based on regression-correlation analysis are eventually reduced to extrapolation to future periods and trends in the development of the proportions that have taken place in the past.

Assessment of the demand for banking services based on regression-correlation analysis is carried out for each market segment. The demand for banking services can vary. It can be negative, when the proposed service under certain circumstances does not suit the market, and it does not accept it. Reasons for the existence of negative demand are as follows [1–3].

– The service offered by the bank has outstripped the needs of customers, and they do not feel its advantages and necessity. At the same time, the marketing task is to attract customers through advertising and explain the benefits of a new product.

– Clients do not know about the new type of services and do not use them.

– The service offered by the bank is lower in quality than similar services offered by competitors. In this case, it is necessary to find a new market for such a product or raise its quality.

There is also zero demand in the market, in which the consumer does not show interest in the offered service, but does not exclude it altogether. There is also a diminishing demand. It is formed at the time of market saturation or obsolescence of the offered service, intense competition and changes in the main factors of the macro-environment. Seasonal demand due to changes in volume and conditions for banking services requests from individual segments Latent (hidden) demand that exists when the bank is unable to meet the demand of a particular market segment. Full demand is formed at a certain balance between demand and supply, and to support which the price of the offered service can be changed. Excess demand is characterized by a mismatch between consumer demands and the ability of banking institutions to satisfy them. To eliminate it, the following marketing activities can be carried out:

– increase in prices for banking services;
– reduction or complete cessation of advertising activities;
– attraction of branches or other banks to provide similar services.

The question of the correct construction of a distribution network is presented to each company that seeks to expand its activities in new sales markets and build a branch network. Geo-marketing methods and models are often used to solve such problems. Geo-marketing emerged on the border of two sciences (marketing and geo-informatics) and became a new direction of analysis using geo-informatics methods.

Geo-marketing is an approach to planning, decision-making, pricing, promotion and implementation of ideas, goods and services (including financial, informational and political) through the use of spatially localized information.

The goal of geo-marketing is to increase the efficiency of doing business based on the spatially-temporal study of real heterogeneous data-monitoring, forecasting, management of spatially distributed business structures by identifying hidden patterns of behavior of demand for products in a spatially distributed context; making decisions aimed at conducting effective business in a changing social and economic environment [8].

Methods in geo-marketing research are aimed at applying two approaches.

1. Justification for opening a retail outlet (in the banking sector – this is a branch), when looking for new places to plan a network “from scratch” or expand the network with an accuracy of a quarter.

2. Analysis of territories, when a plot (or real estate object) is known and it is necessary to analyze a number of characteristics of the future object, as well as predict the performance in this potential location.

Since the demand for banking services depends on many external factors, all of them must be taken into account when forecasting. The most appropriate method that allows you to do this is linear multivariate regression analysis, with the help of which multivariate regression models are built that allow you to accurately predict the demand for banking services and have a number of advantages. They:

1) reflect the relationship between the indicator and the factors being studied;
2) make it possible to assess the degree of influence of individual factors on the indicator;
3) provide determination of the assessment of the influence of all factors on the indicator;
4) are relatively easy to implement on modern electronic computers;
5) make it possible to obtain reliable forecasting results both for the complex dynamics of the development of the object under study, and for the complex relationship between the variables;
6) can be checked by modern mathematical methods for their adequacy to real statistical data;
7) are fairly simple to implement.

When developing a strategy for expanding the bank's branch network, management can prioritize various tasks [9–10], such as:

– creating a profitable network;
– covering the maximum territory;
– ensuring a presence in all regions of the country;
– maximizing the client base and the like.

Depending on the priority of development, various factors are taken into account when choosing the location of bank branches. For a bank that aspires to become, or is already a systemic bank, it is important to build a network in such a way as to achieve all the above goals. But the question is often how to develop a network development strategy and which regions or cities should be considered first. The proposed model, based on many factors, will make it possible to assess the attractiveness of each settlement, which implies a phased expansion of the network on the territory of the Russian Federation [3].

The activities of a bank branch are usually aimed at serving three segments of customers: individuals, small and medium-sized businesses and legal entities. The role of each segment in the structure of the customer base can be different. It depends, first of all, on the priorities of the bank itself, namely, on which target segment its activities are directed. With the beginning of the development of the banking system in the Russian Federation, commercial banks began to work with legal entities and only during the widespread expansion of banking services began to focus on the retail segment.

Today, in the Russian Federation, almost all systemic banks are more focused on the retail business, since it is in this segment that there is great potential for the development and expansion of the bank. Thus, the assessment of the settlement for the opening of a new branch was carried out, taking into account the attractiveness of the territory:

1) to do retail business;
2) to work with small and medium-sized businesses;
3) to attract corporate clients.

For each of these areas, a corresponding indicator is formed, including a number of factors.

Formation of indicators

The retail business performance indicator (Ret index) includes the following parameters:

1) demographic characteristics (population size, population density, natural growth, birth rate, mortality rate);

2) prosperity of the population (average monthly salary, the number of pensioners per capita, the level of registered unemployment, the average annual number of employees, the need of enterprises for workers to fill vacant jobs);

3) the level of consumption (the total number of cars sold in the region, the share of foreign cars, the volume of retail trade, the number of retail trade objects (enterprises), wholesale trade, the volume of services sold to the population, the number of places at the restaurant facilities);

4) the state of the real estate market (provision with housing, investment in fixed assets in housing construction).

The small and medium-sized business performance indicator (SME index) is calculated based on the following parameters:

1) quantitative characteristics (the number of small and medium-sized businesses (SMEs), the number of SMEs per inhabitant);

2) finance (total income of SMEs, average income of one subject, total profit of SMEs, average income of one subject);

3) the level of use of banking services (the amount of deposits of SMEs, the average amount of the deposit per one entity, the amount of loans to SMEs, the average amount of the loan per one entity);

4) personnel (the number of employees at SME enterprises, total salary RAT, average payroll of one SME entity).

The corporate business performance indicator (Corp index) contains the following parameters:

1) quantitative characteristics (the number of corporate business entities), the number of business entities per inhabitant);

2) finance (total income of corporate business entities, average income of one subject, total profit of corporate business entities, average income of one entity);

3) the level of use of banking services (the amount of deposits of corporate business entities, the average amount of the deposit per one subject, the amount of loans of corporate business entities, the average amount of the loan per one subject);

4) personnel (the number of employees at corporate business entities, the general payroll, the average payroll of one corporate business entity);

5) the level of export-import operations (volume of export of goods, volume of import of goods, volume of export of services, volume of import of services);

6) investments (direct foreign investments, investments in fixed assets, investments in fixed assets / per person).

Calculation of factors

Each of the factors in the indicator is defined as the sum of the parameters involved in the formation of the indicator, weighted by the coefficients. The parameters, in turn, are taken into account not in absolute terms, but in relative terms (the ratio of the parameter value in a given region to the average value in Russia):

$$Dem = k_1 * RP + k_2 * RD + k_3 * RNG + k_4 * RBC + k_5 * RDC,$$

where $\Sigma k_i = 1$; *Dem* – demographic characteristics of the region; *RP* is the relative size of the

population; *RD* is the relative population density; *RNG* is relative natural growth; *RBC* is the relative fertility rate; *RDC* is the relative mortality rate.

Coefficients k i for each factor are determined by the bank's experts depending on which of the parameters they consider more significant in the formation of the factor.

Calculation of indicators

Performance indicators for each line of business are calculated as the sum of factors explaining this indicator, weighted by coefficients of significance. Significance ratios are also set at the discretion of specialists. But when analyzing the influence of certain indicators of the region on the success of a bank branch, certain patterns were identified that should be taken into account when establishing the coefficients. In the formation of the indicator of the efficiency of the retail business, demographic characteristics and wealth of the population play a more important role than the consumption market and the state of the real estate market. In terms of efficiency of small, medium and corporate business, the most important factors are the quantitative characteristics and financial condition of SMEs and corporate businesses, and the least significant factor of the personnel of these entities.

Calculation of the integral indicator of the territory attractiveness

In addition to the characteristics of potential client groups, the competitive environment will also affect the activities of the bank branch. Therefore, the model should also take into account the number of branches of other banks in the locality (*Comp*). In the model, this indicator is taken into account as a relative value – the ratio of the number of bank branches in the settlement with the number of branches of other banks in the Russian Federation. Of course, not all branches can be considered, but only those banks that are considered competitors for the bank that carries out such an analysis.

For example, for a retail-oriented bank, banks serving corporate clients will not compete; for large systemic banks, small banks and the like are not competitors.

The integral indicator is calculated as follows [16]:

$$I = (K_1 * Ret\ index + K_2 * SME\ index + K_3 * Corp\ index) / Comp.$$

The K_j coefficients depend, first of all, on the business orientation of the bank and the importance of each segment in the institution's activities. For large systemic banks, the following ratios can be used: $K_1 = 0.6$; $K_2 = 0.25$; $K_3 = 0.15$.

Conclusions

Thus, forecasting of the banking services market involves identifying trends in its development under the influence of the following main factors: political, legal, economic conditions and business activity, inflationary, life cycle stages of banking products, pricing policy, competitive environment, etc.

The model based on the regression-correlation analysis includes three factors:

– indicator of the efficiency of the retail business (RET index);
– indicator of efficiency of small and medium-sized businesses (SME index);
– indicator of corporate business efficiency (Corp index).

Each of the factors in the indicator is defined as the sum of the parameters involved in the formation of the indicator, weighted by the coefficients. The parameters, in turn, are taken into account not in absolute terms, but in relative terms (the ratio of the parameter value in a given region to the average value in Russia). Performance indicators for each line of business are calculated as the sum of factors explaining this indicator, weighted by coefficients of significance. Significance ratios are also set at the discretion of specialists. But when analyzing the influence of certain indicators of the region on the success of a bank branch, certain patterns were identified that should be taken into account when establishing the coefficients. In the formation of the indicator of the effectiveness of the retail business, demographic characteristics and wealth of the population play a more important role than the consumption market and the state of the real estate market. In terms of efficiency of small, medium and corporate business, the most important factors are the quantitative characteristics and financial condition of SMEs and corporate businesses, and the least significant factor of the personnel of these entities.

References

1. Bir, S. Mozg firmy : izd. 2-e / S. Bir; per. s angl. – M. : Editorial URSS, 2005. – 416 s.
2. Brishtelev, A. Osobennosti soglasovaniya interesov tsentralnogo banka i bankov / A. Brishtelev // Bankovskiy vestnik. – 2006. – № 4. – S. 30–34.
3. Garmash, A.N. Ekonomiko-matematicheskie metody i prikladnye modeli / A.N. Garmash, I.V. Orlova, V.V. Fedoseev, V.A. Polovnikov. – M. : YUNITI, 1999. – 391 s.
4. Golubeva, N.V. Matematicheskoe modelirovanie sistem i protsessov : ucheb. posobie dlya vuzov zheleznodorozhnogo transporta / N.V. Golubeva. – SPb. : Lan, 2013. – 192 s.
5. Zaydel, A.N. Matematicheskoe modelirovanie. Postroenie modeley i chislennaya realizatsiya : ucheb. posobie / A.N. Zaydel. – SPb. : Lan, 2016. – 304 c.
6. Kudryavtsev, E.M. GPSS World. Osnovy imitatsionnogo modelirovaniya razlichnykh sistem / E.M. Kudryavtsev. – M. : DMK Press, 2004. – 320 s.
7. Morgenshtern, O. Teoriya igr i ekonomicheskoe povedenie / O. Morgenshtern, J. fon Neyman; per. s angl. pod red. N.N. Vorobeva. – M. : Nauka, 1970. – 708 s.
8. Poddyakov, A.N. Orientirovochnaya i dezorientiruyushchaya osnovy deyatelnosti: ierarkhii tseley obucheniya v konfliktuyushchikh sistemakh / A.N. Poddyakov // Voprosy psikhologii. – 2002. – № 5. – S. 79–84.
9. Poddyakov, A.N. Protivodeystvie obucheniyu konkurenta i «troyanskoe» obuchenie v ekonomicheskom obuchenii / A.N. Poddyakov // Psikhologiya. ZHurnal Vysshey shkoly ekonomiki. – 2004. – № 3. – S. 65–82.
10. Poddyakov, A.N. Tipy protivodeystviya v pomogayushchem povedenii / A.N. Poddyakov // Voprosy psikhologii. – 2010. – № 4. – S. 3–13.
11. Rumyantsev, M.I. Obobshchennaya matematicheskaya model kommercheskogo banka / M.I. Rumyantsev // Kompyuternye nauki i telekommunikatsii. – 2006. – № 4(11). – S. 44–48 [Electronic resource]. – Access mode : http://gesj.internet-academy.org.ge/download.php?id=1276.pdf.
12. Rumyantsev, M.I. Gibridnaya imitatsionnaya model otdeleniya banka kak sistemy massovogo obsluzhivaniya / M.I. Rumyantsev // Kompyuternye nauki i telekommunikatsii. – 2010. – № 2(25). – S. 85–91 [Electronic resource]. – Access mode : http://gesj.internet-academy.org.ge/download.php?id=1635.pdf.
13. Rumyantsev, M.I. Strukturno-morfologicheskiy analiz biznes-protsessov kommercheskogo banka / M.I. Rumyantsev // Informatsionnye tekhnologii modelirovaniya i upravleniya. – 2008. –

№ 9(52). – S. 997–1005.

14. Mikhail, I. Rumyantsev. About some applications of Kolmogorov equations to the simulation of financial institution activity / I. Mikhail // Quantitative Finance Papers. – 2009. – No. 0912.1037. – 8 p. [Electronic resource]. – Access mode : http://arxiv.org/pdf/0912.1037.

Компьютерная реализация регрессионно-корреляционного анализа экономического процесса спроса на банковские услуги в территориальном аспекте

В.А. Гришин

Дзержинский филиал
ФГАОУ ВО «Национальный исследовательский Нижегородский государственный университет имени Н.И. Лобачевского»,
г. Дзержинск (Россия)

Ключевые слова и фразы: банковские услуги; модель; регрессионно-корреляционный анализ; экономический процесс.

Аннотация. В статье представлена трехфакторная модель прогнозирования спроса на основе регрессионно-корреляционного анализа экономического процесса спроса на банковские услуги в территориальном аспекте. Модель на основе многих факторов позволит оценить привлекательность каждого населенного пункта, что предполагает поэтапность расширения сети на территории Российской Федерации.

UDK 339.138(075.8)

Local Events in the Development of Marketing and Image of the Tambov Region

R.G. Guchetl

Tambov State Technical University,
Tambov (Russia)

Key words and phrases: region marketing; territorial marketing; event events; region brand; territory image.

Abstract. The purpose of this article is to study the organization of local events in the development of marketing and creating an image of the Tambov region. To achieve the goal of the study it is necessary to solve the following problems: first, to conduct a terminological analysis of the concept of marketing territories, to identify features of territorial marketing, as well as to substantiate the importance of events in marketing and image development of the Tambov region.

The main hypothesis of this paper is that the role of local events in the development of marketing and creating an image of the region is huge. Such help to develop social, cultural and economic potential of the region, to form a positive image, and to raise the region's attractiveness for residents, investors and tourists.

The research methodology is comparison, scientific research, generalization, analysis and systematization. The results of the study showed that the use of events has a great impact on the development of the region, as well as on the strengthening of interregional and international ties.

Currently, the use of event activities is considered the most interesting in the development of marketing and image of the region. Such events as the organization and celebration of the city, festivals, fairs, presentations, round tables, competitions, races, sports and cultural events are used as events. Local events allow forming the cultural and economic potential of the territory, increasing the image of the region, its attractiveness for investors and tourists.

Today, regions and territories are becoming full-fledged market participants. There is an active growth of competition between them.

Territorial marketing is the most important tool for strategic development and the most comprehensive solution to problems in the region. Today, each territorial unit, each region is unique in its natural, social, economic, resource properties. Therefore, there is a problem of wider use of territorial marketing to improve state and municipal management of territorial units [1].

Territorial marketing is a complex set of managerial work to develop a concept and goals for the development of the region, as well as analysis of the internal and external environment, the existing situation in the region, development strategy and action plans to ensure its competitiveness [7], investment attractiveness, and also improving the quality of life of society. In today's competitive environment, the use of marketing tools for various areas has become relevant. Regional authorities must be able to rationally assess their advantages and disadvantages in a competitive environment. Properly conducted assessment contributes to the favorable positioning of the territory and attracting good cash flow to its economy.

To attract external investors, it is important to position the territory on interregional, national and international platforms, where the territory has the opportunity to promote major brands and thus increase its investment attractiveness [5], which is formed on the basis of its unique features and includes a favorable geographical location, the availability of the necessary engineering support, infrastructure development, the ability to attract skilled labor, the availability of possible benefits for investors, etc. Investment attractiveness of the territory is one of the key factors in increasing its competitiveness, which contributes to high and sustainable economic growth by attracting investment, creating new jobs, as well as the development of individual industries in the region.

Currently, each territorial unit, each region, and municipality is unique in its natural, social, economic, resource properties. Hence, the problem of wider use of territorial marketing to improve the state and municipal management of territorial units is acute [3].

Domestic and foreign scientists have made a huge contribution to the development of the theory of territorial marketing. According to A.M. Lavrov and V.S. Surnin, marketing of territories is designed to ensure a high level and quality of life of the population of the territory [4]. In the opinion of O.T. Ergunova, territorial marketing is defined as marketing in the interests of the territory, which is reduced to the formation, provision and maintenance of its competitiveness in the external environment at the inter-territorial level [2].

Territorial marketing is an integral tool of strategic development and the most comprehensive solution to problems in the territory. When developing the right marketing program, the competitiveness of the territory increases both at the regional and global level.

The main participants of territorial marketing are manufacturers and suppliers of goods, works, services; consumers of goods, works, services; intermediaries (for example, travel agencies and agencies, hotels, catering organizations); territorial management bodies, mass media; other organizations (for example, environmental and other public organizations) [8]. According to A.P. Pankrukhin, they are divided into two groups: external and internal. Conflicts may arise between the participants, for example, foreign investors have decided to build a large oil company in the area, but residents and managers of the territory are against, as the environmental situation will deteriorate [6].

The marketing of the region has its own special characteristics. The main ones are the following:

– marketing events should cover the region as a whole, including its constituent cities, districts, towns, villages;

– marketing events should focus on the interests of all consumers in the region – national communities, youth, retirees, unskilled workers and other socio-economic and demographic groups;

– marketing events should be based on sufficient completeness of information on the interests of all consumers in the region to professionally coordinate the joint activities of the public and private sectors [6].

Fig. 1. Chernozem Rock Festival

Fig. 2. The 9th International Intercession Fair

Today, the Tambov region is actively promoting the events aimed at developing the scientific potential of the region, trade relations, cultural development, sports achievements and protection of the environmental component [9].

The Tambov region has a characteristic resource base for the development of tourism, typical of the Central Federal District of the Russian Federation, so event tourism is developing dynamically. At present, almost every district of the Tambov region holds its own thematic festival or fair, which presents its best products, local traditions, the best local craftsmen and custodians of Russian customs. Each local holiday is characterized by hospitality and variety.

Event marketing is most developed in such towns as Tambov, Michurinsk, Rasskazovo, Uvarovo, as well as in Muchkapsky and Sosnovsky districts. Rural and ecological tourism is represented in Inzhavinsky, Tambovsky, Znamensky districts, as well as to some extent in other municipal districts of the region. Tambov and Michurinsk are centers of business tourism. Pilgrimage (religious) tourism is developed in Tambov, Morshansk, Michurinsk, Sosnovsky district. In Tambov, Michurinsk, Sampur, Uvarovo, Bondari districts, gastronomic tourism is presented, which is a developing type of tourism in the region.

Every year, six international, ten all-Russian and more than thirty regional events are held in the Tambov region. The events include the Chernozem Rock Festival (Fig. 1), the International Intercession Fair (Fig. 2), the traditional Atmanovsky Kulachki Games, and the Michurinskoye Yabloko Festival, which has been awarded the status of National Event 2018 [10].

In 2019, the city of Michurinsk, the Tambov region, hosted for the 14th time the All-Russian exhibition “Gardener’s Day”, in which the “Michurinsk Apple Festival” was organized. The National Calendar of Events for 2019 includes 40 events in the Tambov region.

In the Tambov region, the tourist flow has increased. In 2019, it increased by 6 %. The Tambov region was visited by 953 thousand people last year. These are tourists and participants of the events. More than 12,000 of them are foreigners. In recent years, there has been a marked increase in interest in our region. This is proved by the growth of the tourist flow, the inclusion of the region in the federal project “Russian estates”, and the growth of a number of indicators. The volumes of tax revenues to the budgets of all levels by the collective classification grouping of economic activities “Tourism” are also growing. Dynamics of tourist flow in the Tambov region in 2015–2019 presented in Fig. 3 [11].

Favorable geographical position of the Tambov region promotes the development of tourist services, the low cost of which allows ensuring the attractiveness of these services for different groups.

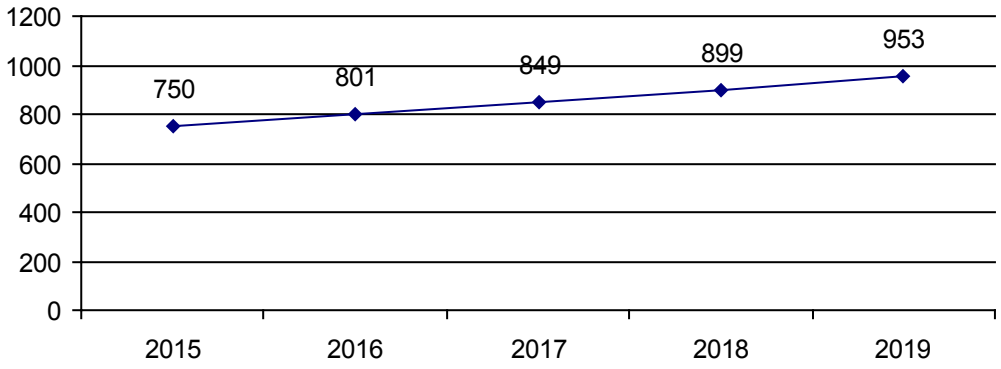

Fig. 3. Dynamics of tourist flow in the Tambov region, thousand people, 2015–2019 [11]

Thus, the Tambov region is a competitive region of the Russian Federation. This region with a unique innovative image is of considerable interest in terms of tourism development and investment.

In the National rating of event tourism, the Tambov region is still included in the "Golden League". For the second year, the region has won the status of "Region-leader in the pace of cultural development: Top 10".

In 2019, eleven Tambov events were included in the top 200 events in the National Calendar. In October 2018, the 8th International Intercession Fair was held in Tambov. In two days it was visited by a record number of guests – 175 thousand people. The trade turnover of the fair amounted to more than 123 million rubles, which is 11 million rubles more than in 2017 and 53 million rubles more than in 2015 [10].

In 2018, the International Intercession Fair was awarded the status of "National Event of 2018". The fair was awarded the diploma of the winner of the competition "Trade of Russia", held by the Ministry of Industry and Trade of the Russian Federation in the nomination "Best Fair" [9].

Thus, the local events play an important role in the development of marketing and creating a positive image of the territories in today's market conditions, in which regions and territories have become full participants. Regional events have a great impact on the development of the region, on the quality of life of the population. Thanks to the events, the turnover has increased, local producers are supported, and the market for agricultural products is expanded. Folk traditions are also being revived. The population of the region, as well as residents of other regions share knowledge and cultural experience; there is a strengthening of interregional and international ties. The recognition of the region for the territories of Russia and abroad is increasing, the number of tourists and guests of the region is increasing.

References

1. Guchetl, R.G. Marketing territorii kak faktor povysheniya sotsialno-ekonomicheskogo urovnya regiona : monografiya / R.G. Guchetl, T.A. Bondarskaya, O.V. Bondarskaya. – Tambov : Izd-vo TOIPKRO, 2019. – 148 s.

2. Ergunova, O.T. Marketing territorii : ucheb. posobie / O.T. Ergunova; M-vo obrazovaniya i nauki Ros. Federatsii, Ural. feder. un-t. – Ekaterinburg : Izd-vo Ural. un-ta, 2017. – 136 s.

3. Kalyuzhnova, T.A. Regionalnyy internet-marketing kak instrument upravleniya sotsialno-

ekonomicheskim razvitiem subektov RF : diss. … kand. ekonom. nauk / T.A. Kalyuzhnova. – M., 2002. – 156 c.

4. Lavrov, A.M. Reformirovanie ekonomiki: regionalnye aspekty / A.M. Lavrov, V.S. Surnin. – Kemerovo : Kuzbassvuzizdat, 1994.

5. Muraveva, M.V. Motivatsionnye instituty ekonomicheskogo razvitiya selskikh territoriy / M.V. Muraveva, A.V. Nayanov // Nauka i biznes: puti razvitiya. – M. : TMBprint. – 2020. – № 5(107). – S. 113–117.

6. Pankrukhin, A.P. Marketing territoriy : uchebnik / A.P. Pankrukhin. – SPb. : Piter, 2006. – 122 s.

7. Salimova, T.A. K voprosu o soderzhanii ponyatiya «ustoychivaya konkurentosposobnost» / T.A. Salimova, L.I. Biryukova // Nauka i biznes: puti razvitiya. – M. : TMBprint. – 2020. – № 5(107). – S. 137–143.

8. Safina, S.S. Tendentsii razvitiya rynka turisticheskikh uslug stran ASEAN / S.S. Safina, I.G. Teterkina // Nauka i biznes: puti razvitiya. – M. : TMBprint. – № 2(104). – 2020. – S. 131–137.

9. Elektronnyy informatsionno-upravlencheskiy portal. Internet-marketing territoriy [Electronic resource]. – Access mode : https://port-u.ru/strategplan/2221-internet-marketing-territorij.

10. Elektronnyy portal internet-marketing 2020. Prognozy i tendentsii [Electronic resource]. – Access mode : https://marketer.ua/internet-marketing-2020-forecasts-and-trends.

11. Elektronnyy informatsionno-upravlencheskiy portal. Potok turistov v Tambovskoy oblasti [Electronic resource]. – Access mode : https://top68.ru/news/111628-tambovskuyu-oblast-stalo-poseshchat-bolshe-turistov.

Применение событийных мероприятий в развитии маркетинга и имиджа Тамбовской области

Р.Г. Гучетль

ФГБОУ ВО «Тамбовский государственный технический университет», г. Тамбов (Россия)

Ключевые слова и фразы: бренд региона; имидж территории; маркетинг региона; событийные мероприятия; территориальный маркетинг.

Аннотация. Целью данной статьи является исследование применения событийных мероприятий в развитии маркетинга и имиджа Тамбовской области. Для достижения цели исследования необходимо решить следующие задачи: провести терминологический анализ понятия «маркетинг территорий», выявить особенности территориального маркетинга, а также обосновать важность применения событийных мероприятий в развитии маркетинга и имиджа Тамбовской области.

Основной гипотезой данной работы является предположение, что событийные мероприятия играют важнейшую роль в развитии маркетинга и имиджа территории. С их помощью происходит развитие социального, культурного и экономического потенциала области, они помогают сформировать положительный имидж, а также повысить привлекательность территории для жителей, инвесторов и туристов.

Методологией исследования является сравнение, научный поиск, обобщение, анализ и систематизация. Полученные результаты исследования показали, что применение событийных мероприятий оказывает значительное влияние на развитие региона, на его узнаваемость, имидж и бренд Тамбовской области, а также на укрепление межрегиональных и международных связей.

UDK 338.2

On the Formation of a Management System for the Development of Innovative Potential

L.N. Ridel, T.V. Dubrovskaya

M.F. Reshetnev Siberian State University of Science and Technology, Krasnoyarsk (Russia)

Key words and phrases: innovative potential analysis; innovative potential assessment; development; development management; innovation; innovative potential; innovative strategy.

Abstract. The purpose of the article is to identify approaches to the formation of a system for managing the development of innovative potential. To achieve the goal of the study, it is necessary to solve the following problems: to clarify the concept of “innovative potential”, to analyze the innovative potential of the company, to determine the relationship between the management system for the development of innovative potential and the effectiveness of the organization. The main hypothesis of the study is the assumption that an effective management system for the development of innovative potential will significantly increase the efficiency of the organization’s production and financial activities. The study used methods of comparative analysis, general analysis and synthesis, modeling. The results provide an opportunity to identify the main problems of developing an innovation capacity management system, which will improve the efficiency of the organization.

The innovative potential of the enterprise is the ability of the enterprise to obtain its own innovative product, which is endowed with new, unique, and not previously encountered properties, considering the impact of the external environment with sufficient resource support in current competitive conditions.

In order to form a system for managing the innovative potential development, it is necessary to assess the current state of the company, as well as to get an actual assessment of the innovative potential. Let us take this as an example of a company that does not produce its own products, but is an intermediary company for the supply of petroleum products.

In this study, we evaluate the innovative potential by integral blocks of parameters. Four parameter blocks are highlighted.

The first block is manufactured products. The company does not produce any products; it is an intermediary between the supplier and the consumer, that is, it buys products for retail and wholesale resale.

The second block is the potential of innovative development of the enterprise. The qualification and number of staff allows the company to develop. Our own quality control laboratory can be used as our own research base. The marketing complex has become much better in recent years.

The third block is the conditions for the operation of the enterprise. The breadth of market coverage of the company is rather high. Compared to its closest competitors, the company has the greatest degree of market coverage.

The fourth block is investment attractiveness. The investment attractiveness of the industry is high, since a lot of funds are invested in oil production and refining. Also, the income from the sale of petroleum products is high, which indicates investment attractiveness.

A condensed analysis of the company by four parameter blocks shows what you can direct your innovative potential on, or to be more precisely, where to look for it. The development of the innovative potential must be embedded in the main activity of the company.

The considered approach to the formation of the development management system for the innovative potential corresponds to the goals and objectives of the facility and favorable conditions for its operation. The system must be effective, which implies the speed, reliability and quality of applied solutions; minimization of the associated time and resources, cost-effective total costs for maintenance of the management apparatus, the increase of technical and economic indicators of the main activity and working conditions, the optimal share of management employees in the entire personnel of the organization.

The application of the main methodological provisions on forming the development management system of the company's innovative potential in practice makes it possible to reasonably revise strategic guidelines and obtain an economic effect expressed in increasing the level of the innovative potential, strengthening its market positions, and increasing the efficiency of its production and financial activities.

References

1. Dubrovskaya, T.V. Otsenka innovatsionnogo potentsiala s pozitsiy osnovnykh steykkholderov / T.V. Dubrovskaya, L.N. Ridel // Globalnyy nauchnyy potentsial. – SPb. : TMBprint. – 2020. – № 2. – S. 135–138.

2. Dubrovskaya, T.V. Issledovanie podkhodov k opredeleniyu innovatsionnogo potentsiala kak ekonomicheskoy kategorii / T.V. Dubrovskaya, L.N. Ridel, A.V. Kovalets // Nauka i biznes: puti razvitiya. – M. : TMBprint. – 2020. – № 4(106). – S. 91–96.

3. Ridel, L.N. Osobennosti innovatsionnogo potentsiala v neftepererabatyvayushchey otrasli / L.N. Ridel, N.A. Pecheritsa // Nauka i biznes: puti razvitiya. – M. : TMBprint. – 2018. – № 11(89). – S. 170–172.

К вопросу о формировании системы управления развитием инновационного потенциала

Л.Н. Ридель, Т.В. Дубровская

ФГБОУ ВО «Сибирский государственный университет науки и технологий имени М.Ф. Решетнева», г. Красноярск (Россия)

Ключевые слова и фразы: анализ инновационного потенциала; инновационная

стратегия; инновационный потенциал; инновация; оценка инновационного потенциала; развитие; управление развитием.

Аннотация. Целью статьи является определение подходов к формированию системы управления развитием инновационного потенциала. Для достижения цели исследования необходимо решить следующие задачи: уточнить понятие «инновационный потенциал», провести анализ инновационного потенциала компании, определить взаимосвязь системы управления развитием инновационного потенциала и эффективности функционирования организации. Основная гипотеза исследования состоит в предположении, что эффективная система управления развитием инновационного потенциала значительно повысит эффективность производственно-финансовой деятельности организации. В ходе исследования были использованы методы сравнительного анализа, общего анализа и синтеза, моделирования. Полученные результаты позволяют определить основные проблемы формирования системы управления развитием инновационного потенциала, решение которых позволит повысить эффективность функционирования организации.

UDK 378

Ecological Development of Society through the Prism of Spiritual Values

E.S. Starchikova

Moscow State University,
Moscow (Russia)

Key words and phrases: eco-education; ecological culture; ecology; environmental knowledge; global education; nature-like technologies; spiritual values.

Abstract. The purpose of the article is to state the relevance of the ecological development of society through the prism of the spiritual values of mankind. The main hypothesis is related to the fact that the most important condition for the self-preservation and sustainable development of human civilization is a high level of not only environmental education and culture of the younger generation, but also the spiritual component of the educational process in the modern era. The objective of the study was to consider the stages of the formation of mankind, taking into account its relationship to nature. Based on theoretical methods – analysis, synthesis, generalization, description, comparison and systematization – the author proposes to demonstrate the spiritual potential for the formation of the ecological culture of young people through the integrative connection of Ecology with such a discipline as Philosophy. The research hypothesis is related to the assumption that spirituality is reflected in a person's relationship to nature and the environment. Awareness of this connection will give the necessary solution algorithm to eliminate the negative consequences of human activity. As a result of the study, the following were considered: modeling the process of forming the spiritual and, subsequently, ecological culture of students, the implementation of interdisciplinary relations of several disciplines and the analysis of the effectiveness of the pedagogical approaches.

Under globalization the social and natural interaction is the main component of sustainable development of society, where spiritual values play an important role in the self-preservation and development of human civilization. Mastering the process of scientific knowledge, the use of natural technologies, the introduction of wasteless production, environmental education and the development of eco-culture in the masses are the fundamental points leading to the creation of a harmonious relationship between society and nature. Man is a creation of nature itself,

which is driven by the instinct of self – preservation, so to consider the development of humanity through the formation of spiritual values is necessary and reasonable in relation to the human race itself.

In the process of development and change of the environment, the stages of formation of a separate individual of society are being formed, the problem of the relationship "man – environment" is being updated. The interaction of these two concepts has always been relevant, since these concepts are inextricably linked, support and strengthen each other. Today, with the prefix "eco", many words have been added to the Russian language, some of which are: eco-education, eco-culture, eco-knowledge, ecology, eco-project, eco-problem, ecosystem, etc. [5].

Ecology as a concept was born long ago. We can say that one of the first ecologists was Aristotle. According to the origin of the ancient Greek word "ecology", it can be understood that it is formed from two roots: *eco* – house, dwelling, *logia* – science, i.e. the science of the house [2]. Ernst Haeckel (1834–1919), a German naturalist and philosopher, was the first to define it as "the science of the interaction of living organisms and the environment". Ecology is a rather problematic topic, so a wide range of natural Sciences is devoted to it, including philosophy. It helps to reveal the ethical and moral qualities of a person, show his inner world, his spirituality, help to achieve a moral ideal, and enrich the spiritual culture of an individual. Ecology in conjunction with philosophy studies the most complex world of humanity, aspects of the health of the entire planet, all living things, and also forms a social philosophical knowledge of the world. Such great philosophers as Aristotle, Theophrastus, Pliny the Elder, Hippocrates, and Humboldt studied the interdisciplinary connection between Ecology and Philosophy. They argued that without philosophical knowledge, it is impossible to cure the world of a spiritless attitude towards it. Philosophy is needed in this sense as air for creating a new person's worldview.

Of course, we can say that Ecology and Philosophy are completely different sciences, but if we look at their functions, we can find the unity of their meaning for humans. Both Philosophy and Ecology set purposes, try to overcome them, develop a step-by-step method for identifying the problem, and they also research and implement a special methodology for their actions. These sciences have one task, and this task is to save humanity from spiritual and environmental diseases, prolong its existence and increase natural growth. First of all, Philosophy helps the inner world, it brings morality to normal, and ecology strengthens and preserves our nature and environment. From time immemorial, people believed that if a person lives in harmony with nature, then he gets the gift of happiness to live on this planet in an environmentally friendly environment.

Today, according to the "Fundamentals of state policy in the field of environmental development of the Russian Federation until 2030", the formation of environmental culture, the development of environmental education and education are the primary tasks of society [6]. The humanization of today's education based on spiritual values, the moral position of young people, their responsible decisions for the future of the planet Earth should be redirected to the creative process, using nature-like technologies in the technosphere, developing the most important life principle "Don't harm all living things". Competitions, exhibitions, Olympiads, and eco-projects, both Russian and international, will help to foster a humane attitude to all living things, in which schoolchildren and students can take part in order to improve their knowledge and apply it in practice [1; 3; 7]. Environmental education of schoolchildren and students can be distinguished as an educational process with a certain level of knowledge in the field of ecology, as well as an opportunity to solve environmental challenges of our time.

Involving young people in the process of social activity can give students and schoolchildren not only knowledge and professional competencies, but also form a clear civic position; a person

who makes decisions in the problems of human harmony with nature [4]. Modern ecology, within the framework of philosophical thinking and its approaches, minimizes the role of this knowledge, and increasingly becomes dependent on the rapid enrichment of the individual at any cost, even at the cost of losing their own habitat and searching for new exoplanets for the development and viability of our civilization.

Summing up the above, it is noteworthy that spiritual values are formed throughout the life of an individual and how an individual uses his capabilities in solving environmental problems depends on his moral image, the presence or absence of the basis of environmental education, its humanitarian component, and the successful implementation of the accumulated knowledge in practice to overcome the environmental crisis in Russia. The situation can change only when a person begins to “listen” to nature and “feel” the impending disease.

References

1. Belova, S.B. Uglerodnyy sled: problemy i puti resheniya / S.B. Belova, I.YU. Starchikova, E.S. Starchikova // Nauka i biznes: puti razvitiya. – M. : TMBprint. – 2020. – № 3(105). – S. 19–21.

2. Belova, S.B. Vliyaniya ekologicheskoy tematiki na mirovozzrenie shkolnikov i studentov tekhnicheskikh vuzov pri obuchenii inostrannomu yazyku / S.B. Belova, E.S. Starchikova, I.YU. Starchikova // Perspektivy nauki i obrazovaniya. – 2018. – № 5(35). – S. 74–81.

3. Egorova, YU.B. Issledovanie personalnogo uglerodnogo sleda studentami vuza / YU.B. Egorova, S.B. Belova, I.YU. Starchikova, E.S. Starchikova // Perspektivy nauki. – Tambov : TMBprint. – 2020. – № 5(128). – S. 111–113.

4. Kolesnikov, YU.YU. Ekologicheskiy imperativ: dukhovno-paradigmaticheskiy diskurs : avtoref. diss. … kand. filosof. nauk / YU.YU. Kolesnikov. – Stavropol, 2006. – 26 s.

5. Leshchinskaya, V.V. Ekologicheskaya kultura: neskolko shagov k ponimaniyu ponyatiya. Rol bibliotek Rossii v formirovanii ekologicheskoy kultury / V.V. Leshchinskaya // Liga kultury. – 2014. – № 4. – S. 168–171.

6. Osnovy gosudarstvennoy politiki v oblasti ekologicheskogo razvitiya Rossii na period do 2030 goda, 2015 [Electronic resource]. – Access mode : http://special.kremlin.ru.

7. Shakurova, E.S. Environmental education of students in the process of intercultural communication in a foreign language / E.S. Shakurova, E.S. Starchikova // Global Scientific Potential. – 2020. – № 4(109). – P. 56–58.

Экологическое развитие общества сквозь призму духовных ценностей

Е.С. Старчикова

ФГБОУ ВО «Московский государственный университет имени М.В. Ломоносова», г. Москва (Россия)

Ключевые слова и фразы: глобальное образование; духовные ценности; природоподобные технологии; эковоспитание; экологическая культура; экологические знания; экология.

Аннотация. Целью статьи является констатация актуальности экологического развития общества сквозь призму духовных ценностей человечества. Важнейшим условием са-

мосохранения и устойчивого развития человеческой цивилизации является высокий уровень не только экологического воспитания и культуры подрастающего поколения, но и духовной составляющей образовательного процесса в современную эпоху. Задачей исследования стало рассмотрение этапов становления человечества с учетом его отношения к природе. На основе теоретических методов – анализа, синтеза, обобщения, описания, сравнения и систематизации – автор предлагает продемонстрировать духовный потенциал для формирования экологической культуры молодежи посредством интегративной связи экологии с такой дисциплиной, как философия. Гипотеза исследования состоит в предположении, что духовность отражается на отношении человека к природе и окружающей среде. Осознание этой связи даст необходимый алгоритм решения для устранения негативных последствий техногенной деятельности человека. В результате проведенного исследования рассмотрены моделирование процесса формирования духовной и впоследствии экологической культуры студентов, реализация междисциплинарных связей нескольких дисциплин и анализ эффективности предложенных педагогических подходов.

List of Authors

Shevtsova M.A. – Student, Far Eastern Federal University, Vladivostok (Russia), E-mail: shevtsova.man@mail.ru

Шевцова М.А. – студент Дальневосточного федерального университета, г. Владивосток (Россия), E-mail: shevtsova.man@mail.ru

Bozhenko A.M. – Student, Far Eastern Federal University, Vladivostok (Russia), E-mail: bozhe_nakhodka@mail.ru

Боженко А.М. – студент Дальневосточного федерального университета, г. Владивосток (Россия), E-mail: bozhe_nakhodka@mail.ru

Albutova T.K. – Student, Far Eastern Federal University, Vladivostok (Russia), E-mail: albutova.tatya@yandex.ru

Албутова Т.К. – студент Дальневосточного федерального университета, г. Владивосток (Россия), E-mail: albutova.tatya@yandex.ru

Wang Long – Master, Inner Mongolia Autonomous Region People's University, Tongliao (China), E-mail: zhaomeng0819@mail.ru

Ван Лонг – магистр, Народный университет автономного района Внутренняя Монголия, г. Тунляо (Китай), E-mail: zhaomeng0819@mail.ru

Ya-quan Xie – Staff, Bureau of Housing and Urban-Rural Development, Otog-Qianqi (China), E-mail: 378836386@qq.com

Се Яцюань – сотрудник Управления по строительству города и деревни, г. Отог-Цяньци (Китай), E-mail: 378836386@qq.com

Gui-fang Fan – Associate Professor, College of Architecture, Inner Mongolia University of Technology, Hohhot (China), E-mail: fgfang65@126.com

Фань Гуйфан – доцент факультета архитектуры Технологического университета Внутренней Монголии, г. Хух-Хото (Китай), E-mail: fgfang65@126.com

Grishin V.A. – Candidate of Technical Sciences, Associate Professor, Department of Mathematics and Computer Science, Dzerzhinsk Branch of Lobachevsky Nizhny Novgorod State University, Dzerzhinsk (Russia), E-mail: vagrish@list.ru

Гришин В.А. – кандидат технических наук, доцент кафедры математики и информатики Дзержинского филиала Нижегородского государственного университета имени Н.И. Лобачевского, г. Дзержинск (Россия), E-mail: vagrish@list.ru

Guchetl R.G. – Candidate of Economic Sciences, Associate Professor, Department of Economic Security and Quality, Tambov State Technical University, Tambov (Russia), E-mail: ruzana707@mail.ru

Гучетль Р.Г. – кандидат экономических наук, доцент кафедры экономической безопасности и качества Тамбовского государственного технического университета, г. Тамбов (Россия), E-mail: ruzana707@mail.ru

Riedel L.N. – Candidate of Economic Sciences, Associate Professor, Department of Economics and Organization of Branches of the Forest Complex, M.F. Reshetnev Siberian State University of Science and Technology, Krasnoyarsk (Russia), E-mail: ridell@mail.ru

Ридель Л.Н. – кандидат экономических наук, доцент кафедры экономики и организации отраслей лесного комплекса Сибирского государственного университета науки и технологий имени М.Ф. Решетнева, Красноярск (Россия), E-mail: ridel.l@mail.ru

Dubrovskaya T.V. – Candidate of Economic Sciences, Associate Professor, Department of Economics and Organization of Branches of the Forest Complex, M.F. Reshetnev Siberian State University of Science and Technology, Krasnoyarsk (Russia), E-mail: tvd2005@mail.ru

Дубровская Т.В. – кандидат экономических наук, доцент кафедры экономики и организации отраслей лесного комплекса Сибирского государственного университета науки и технологий имени М.Ф. Решетнева, Красноярск (Россия), E-mail: tvd2005@mail.ru

Starchikova E.S. – Student, Moscow State University, Moscow (Russia), E-mail: starchikova.e.s@gmail.com

Старчикова Е.С. – студент Московского государственного университета имени М.В. Ломоносова, г. Москва (Россия), E-mail: starchikova.e.s@gmail.com

FOR NOTES

COMPONENTS OF SCIENTIFIC AND TECHNOLOGICAL PROGRESS
№ 10(52) 2020
SCIENTIFIC AND PRACTICAL JOURNAL

Manuscript approved for print 19.10.20
Format 60.84/8
Conventional printed sheets 4.42
Published pages 4.27
200 printed copies

Printed by Zonari Leisure LTD. Paphos