

UDC 529

## REALIZED MODERNIZATION IN FORESTRY OF JAPAN AND FINLAND

Mazurkin P.M.

*Mari state technical university, Yoshcar-Ola, Russia**E-mail: kaf\_po@mail.ru*


---

Crisis management of forests and rapid modernization and rationalization of forest has been established in Japan and Finland after World War II. This has helped a large-scale conversion of military-industrial complex in these countries.

---

**Keywords:** forest case, the limits of growth, streamlining forest

The crisis wood management and fast wood exploitation modernizing were adjusted in Japan and Finland at once after the Great Patriotic War. Conversion of defense industry of these countries was helped by this [1].

**Finland** has achieved territory wood-ness maximum, therefore square it's wood changes about one level, trying for growing advanced wood processing volumes to receive maximal raw wood from Russia, first of all, maintaining Karelian and other near-border woods another's for Finland.

Such policy hereafter will not give Finland anything good, if it, as well as Sweden, other meas-ures will not overcome growth limit on square of national wood. Differently in 10–15 years it is neces-sary consciously to reduce issue of wood production (if, certainly, Russia will begin to increase issue not less qualitative wood production).

The regularity of dynamics (table 1, fig. 1) is determined by the statistical equation

$$S = 22502,60 \exp(0,021025t^{0,16935}) + A \cos(\pi t / p - 4,99580), \quad (1)$$

$$A = 18183558,0t^{4,04845} \exp(-8,45422t^{0,27051}),$$

$$p = 0,0049231 + 0,32123t^{1,00236}.$$

In the formula (1) all is positive: the main trend has exponential growth law kind, before second component there is a positive sign, and half of period of positive oscillatory perturbation grows in due course (so positive wood adaptation to the external medium happens). Because of period magnification and oscillation amplitude decrease the wood of Finland has dynamics under the law of aperiodic oscillation that is the gradual degeneration of wave perturbation happens. How-

ever in the period half formula the initial significance in a 1971 year was only 0,0049 years or only 0,06 months (or only 1,8 days). Since 1985 year (only 10,4 thousand ga of positive adaptation on second component) the oscillatory perturbation has become to grow, since a 1986 year has turned by negative sign in the crisis party, and by 1994 year has achieved 107,6 thousand ga. Crisis amplitude magnification has taken place in 10 times. Though the significance of a crisis wave makes only

$100 \cdot 107,6 / 23214,2 = 0,465$ , however for past 12 years this amplitude can be quite enlarged also. That is to say the orientation of the Finnish enterprises completely on Russian sticks can appear rather crisis for all Finland.

In our country long time the economists did not recognize the theory of cyclicity and wave oscillatory perturbation of economy.

After all, as the practice of development advanced and economically devel-

Table 1

Finland wood square dynamics, thous. ga

Account-able year	Time $t$ , years	The fact $S$	Settlement significances (1)			Components	
			S	$\varepsilon$	$\Delta$ , %	$S_1$	$S_2$
1971	0	22530	22502,6	-27,40	-0,12	22502,6	0,0
1972	1	22690	22686,9	-3,06	-0,01	22980,7	-293,8
1973	2	22840	22834,5	-5,45	-0,02	23041,0	-206,4
1974	3	23000	23025,1	25,12	0,11	23079,7	-54,6
1975	4	23160	23169,3	9,33	0,04	23108,9	60,4
1976	5	23321	23261,5	-59,45	-0,25	23132,6	128,9
1977	6	23321	23313,3	-7,65	-0,03	23152,7	160,7
1978	7	23321	23337,1	16,14	0,07	23170,1	167,0
1979	8	23321	23342,7	21,74	0,09	23185,6	157,1
1980	9	23321	23337,2	16,20	0,07	23199,6	137,6
1981	10	23321	23325,4	4,39	0,02	23212,3	113,1
1982	11	23321	23310,5	-10,48	-0,04	23224,0	86,5
1983	12	23321	23294,7	-26,28	-0,11	23234,9	59,8
1984	13	23321	23279,3	-41,71	-0,18	23245,1	34,2
1985	14	23222	23265,0	43,05	0,19	23254,6	10,4
1986	15	23222	23252,4	30,43	0,13	23263,6	-11,2
1987	16	23222	23241,6	19,65	0,08	23272,1	-30,5
1988	17	23222	23232,8	10,76	0,05	23280,2	-47,4
1989	18	23222	23225,7	3,73	0,02	23287,9	-62,1
1990	19	23373	23220,5	-152,55	-0,65	23295,2	-74,8
1991	20	23222	23216,8	-5,19	-0,02	23302,3	-85,4
1992	21	23186	23214,6	28,64	0,12	23309,0	-94,4
1993	22	23186	23213,8	27,81	0,12	23315,5	-101,7
1994	23	23186	23214,2	28,16	0,12	23321,8	-107,6

oped countries has shown, wave of slack periods and takeoffs is not terrible, if they do not introduce disbalance to all system.

Therefore, if anything the small oscillatory movement of economic parameters, in this case country wood square

oscillations, shows good adaptive possibilities for the account of constantly up-dated economic mechanisms of wood

management and development programs adapted to really changed natural real conditions.

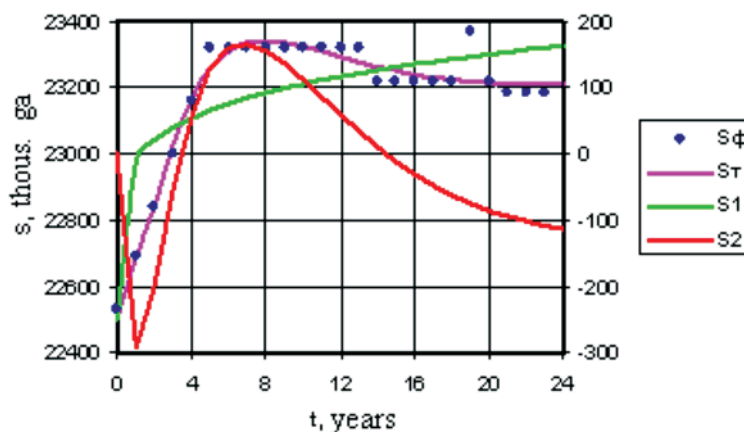


Fig. 1. Dynamics of Finland wood square

Russians, instead of Finns are guilty in that Finland maximally consumes Russian, besides low-price, raw wood for the wood enterprises and protects the wood resources.

Japan territory is congested (main limit of growth [2]) and consequently it should manoeuvre on a limit of practi-

cally possible woodiness. Therefore, as well as in Finland, the Japan wood has growth limits on square (table 2, fig. 2) under the formula (the aperiodic oscillation law without wave wood square perturbation because of rigid wood management under the mechanics law is applied):

$$S = 24228,66 \exp(8,7169 \cdot 10^{-7} t^{2,66692}) + 10,7037 t^{2,47066} \exp(-0,19469t). \quad (2)$$

Totally adaptability factor of Japan [2] to the wood was equal to  $481,4/24248,4 = 0,0199$  or 1,99% in a 1984 year. Therefore it is necessary to expect, that the Japanese necessarily will invent the program of forest science, overcoming by the measures an existing territorial wood growth limit. Transformation of house roofs in cities in green gardens, growth rooms and growth rooms in Japan has become one from far-seeing measures. Apparently, while only any mountain territory, which is expensive and difficult for using but on slopes it will be quite pos-

sible to cultivate new wood plots, is partial free. Thus on the future there will be a main wood development trend on the first component model (2).

From the graphs in a fig. 2 it is visible, that after a 2006 year second component of aperiodic oscillations will probably can be absent in Japan wood development. Then there will be a main trend.

Wood stability and sticks production. The most difficult management by dynamics will be at such process, where for decades downswing with rather force wave perturbation happens. Therefore

Table 2

Japan wood square dynamics, thous. ga

Account-able year	Time $t$ , years	The fact $S$	Settlement significances (1)			Components	
			$S$	$\varepsilon$	$\Delta$ , %	$S_1$	$S_2$
1971	0	24241	24228,7	-12,34	-0,05	24228,7	0,0
1972	1	24241	24237,5	-3,51	-0,01	24228,7	8,8
1973	2	24241	24269,0	27,99	0,12	24228,8	40,2
1974	3	24241	24319,1	78,15	0,32	24229,1	90,1
1975	4	24500	24380,5	-119,55	-0,49	24229,5	150,9
1976	5	24500	24445,8	-54,18	-0,22	24230,2	215,6
1977	6	24500	24509,6	9,63	0,04	24231,2	278,5
1978	7	24500	24567,9	67,89	0,28	24232,4	335,4
1979	8	24500	24618,1	118,08	0,48	24234,1	384,0
1980	9	24728	24658,9	-69,10	-0,28	24236,1	422,8
1981	10	24728	24690,0	-38,02	-0,15	24238,5	451,5
1982	11	24728	24711,6	-16,38	-0,07	24241,3	470,3
1983	12	24728	24724,6	-3,44	-0,01	24244,6	479,9
1984	13	24728	24729,8	1,83	0,01	24248,4	481,4
1985	14	24717	24728,6	11,60	0,05	24252,7	475,9
1986	15	24717	24722,1	5,08	0,02	24257,6	464,5
1987	16	24717	24711,4	-5,57	-0,02	24263,0	448,4
1988	17	24717	24697,8	-19,22	-0,08	24269,1	428,7
1989	18	24717	24682,1	-34,88	-0,14	24275,7	406,4
1990	19	24621	24665,3	44,34	0,18	24283,0	382,3
1991	20	24621	24648,2	27,21	0,11	24291,0	357,2
1992	21	24621	24631,4	10,36	0,04	24299,7	331,6
1993	22	24621	24615,3	-5,66	-0,02	24309,1	306,2
1994	23	24621	24600,6	-20,43	-0,08	24319,3	281,3

list from four wood production groups is composed on aggravation or wood control quality decrease because of balancing loss increase on felling volumes of raw wood as sticks.

In table 3 two countries from the fourth group [2] are indicated.

Most surprising here that only very much few countries monitor behind the woods, not exceeding wood cabin vol-

umes on sticks. Japan at which all wood arrays have turned to parks because of country congestion is sharply selected.

**Comparison of wood square dynamics and sticks production.** Further in table 4 modification comparison of wood square and sticks felling volume is shown. For want of it in data of OON [2] there was no information about woods for period from 1995 till 2005.

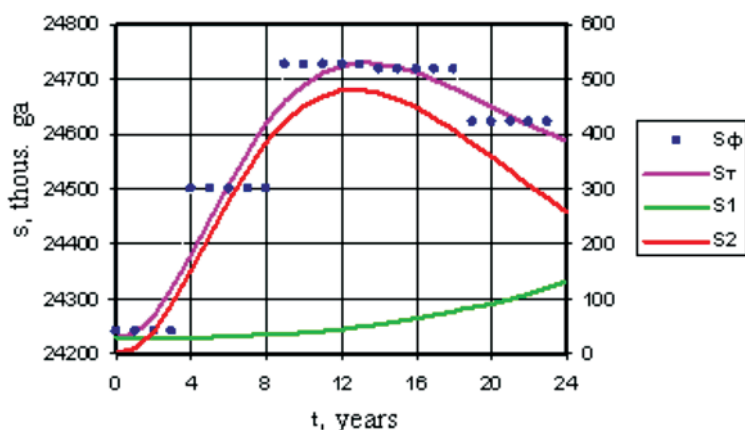


Fig. 2. Dynamics of Japan wood square

Table 3

Countries of fourth subgroup is downturn or downturn with Oscillatory perturbation

Finland		$V = 43935500,0 \exp(-0,0033980t) + 1,5248 \cdot 10^{-17} t^{22,3233} \exp(-0,75851t)$
Japan		$V = 65604897,0 \exp(-0,037484t^{0,95143})$

The pairs of the graphs of wood square growth and sticks production volume dynamics modification are rather various. Russia seems in particular informational poorly. Even in USSR, which guidance always considered itself stable in a behaviour and most successful managing system in the world, force oscillatory

perturbation of sticks felling volume has existed.

The Soviet economists did not at all recognize cyclical laws and regularities, therefore statistical data either were not resulted or consciously were distorted by introduction of various economic indexes and relative economic parameters (growth

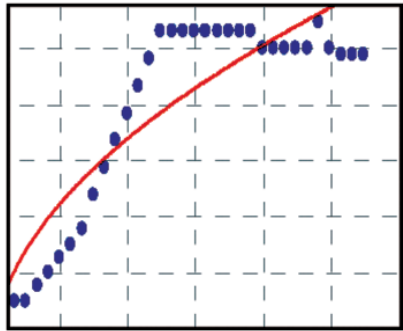
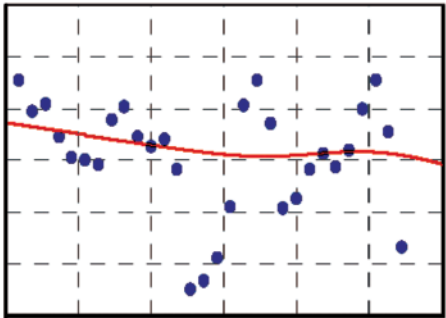
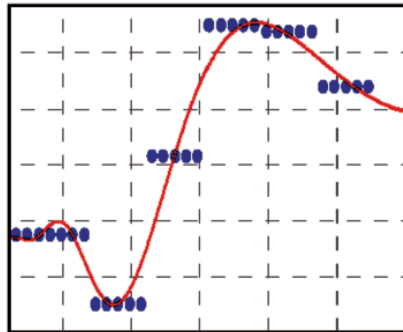
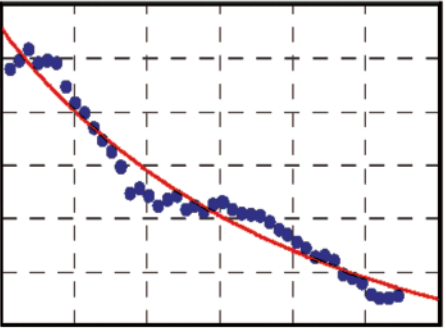
rates on five-year plans are prime example). In the total the forestry experience in our country is a present information pageantry, therefore we everyway shall be careful to those economists, which operate by expenditures connected with man-

agement of forestry, wood and woodusing industry.

Therefore the further analysis of the world tendencies on other groups of wood production – sawn wood, boards, paper and carton is necessary.

**Table 4**

Comparison of countries on dynamics of national wood square and sticks production

Country	Dynamics of wood square from 1961 till 1994, thous. ga	Dynamics of sticks production from 1961 till 1994, m <sup>3</sup>
Finland		
Japan		

In forestry the transformation as «a wood – sticks» is master link.

In people consciousness (in main it concerns the wood workers), the strongest reduction (simplification) complicated up to a transcendence (infinite indeterminacy because of small knowledge of the people about wood capability) of concept «wood» up to primitive narrow certain by practice material concept «crop» happens.

The rest is paperwork (of methods and tree cut means) – mostly all trees of crop are cut down, per the last decades even

seed bearers aren't leaved (procurement officers of raw wood point to on woodgrowers, that they will plant foundation stocks and will restore crop by artificial reafforestation). Thus, all wood users seeing and realizing a wood only as protruding from ground tree stems of correct on the form and quality of wood act as bonkers wolf from victim mass (remaining hinders them in work on sticks dimension).

Such behaviour of the people, in particular among the public persons and businessmen, should be changed in the

radical in Russia. For this purpose it is necessary to understand, how do other countries behave for many a long day (several decades) of sticks circulation (import, production and export). Besides return process forming a cycle of the full sticks circulation, as for example, it is executed to paper by salvaging waste paper, does not happen. Therefore for wood sticks (cut tree stick parts) is irrevocable loss.

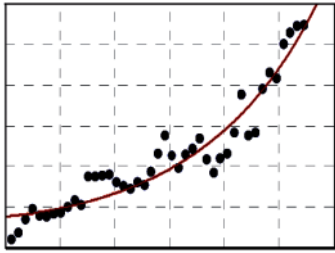
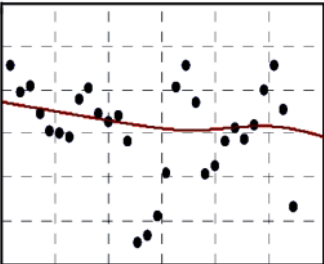
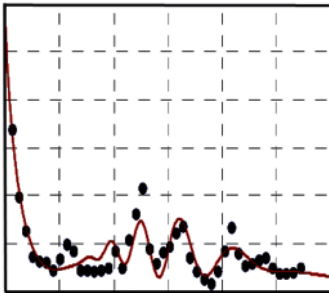
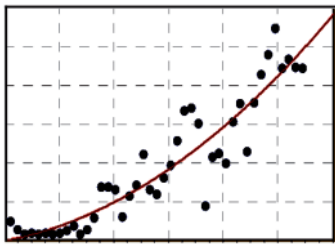
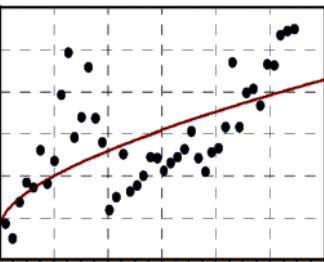
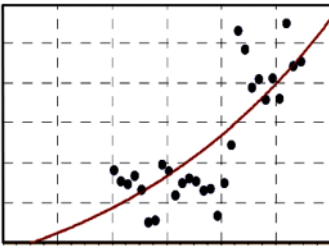
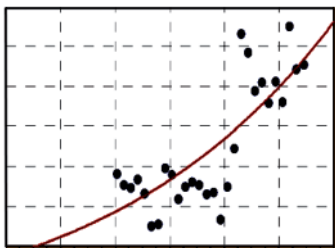
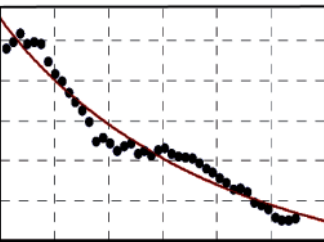
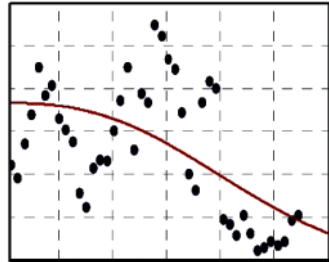
Sticks – country behaviour style. Dynamics in a period of 1961-2004 years, that is for past 44 years, will show be-

haviour style of country relating to realized turn country group (up to 1961 and till a 1994) on wood square dynamics. In table 5 the basic data of FAO OON [38] (44 points) and lines (trend equation) on import, production and export of sticks, that is round forest products (only 31 countries) are indicated.

At once we shall remark, that the decrease of production of sticks and management of this process even up to wood square growth rate level is the main purpose of a joint management by wood (table 5).

Table 5

World round wood material volume dynamics, m<sup>3</sup>

Wood import	Sticks production	Sticks export
Finland		
		
Sweden		
		
Japan		
		

The style of a behaviour of country in forestry in the field of the circulation of sticks is determined by ratio of three processes of person behaviour with finish products, in this case with sticks, is an import, production in country, export of production surpluses (in our country excessive «surpluses» are resulted) or re-export of finish products cheaply bought from other countries (more often here too Russia acts).

The best and far-seeing strategy of a behaviour with sticks has appeared at Japan: it has reduced volumes on all three processes of handling production. Therefore many subjects of Russian Federation, in particular deficient on wood regions, can be studied at the wood users and woodgrowers of Japan.

**Country behaviour trend models.** The statistical equations are of the form (sequentially statistical models of import, production and export of sticks):

– Finland

$$V = 1869661,5 \exp(0,016975t^{1,25996}); \quad (3)$$

$$V = 43935500,0 \exp(-0,0033980t) + 1,5248 \cdot 10^{-17} t^{22,3233} \exp(-0,75851t); \quad (4)$$

$$V = 3255180,8 \exp(-0,050788t^{1,00246}) + A_1 \cos\left(\frac{\pi t}{p_1} - 3,38458\right) + A_2 \cos\left(\frac{\pi t}{p_2} + 1,14480\right); \quad (5)$$

$$A_1 = 3,4013 \cdot 10^{-8} t^{14,20041} \exp(-0,60236t);$$

$$p_1 = 0,53657 + 0,028697t^{1,02687};$$

$$A_2 = 6709685,5 \exp(-0,34342t^{0,67246});$$

$$p_2 = 7,67786 + 1,76121t^{0,61590};$$

– Japan

$$V = 8953988,3 + 1043391,1t^{2,10284} \exp(-0,14974t); \quad (6)$$

$$V = 65604897,0 \exp(-0,037484t^{0,95143}); \quad (7)$$

$$V = 30039,9 \exp(-9,1474 \cdot 10^{-5} t^{2,55334}). \quad (8)$$

The full statistical model is indicated for USSR – Russia transformed after socio-economic and political crises that in wave components are also shown. Such

statistical model will allow giving the forecasts for 30 years forwards, that is till a 2040 year, so as anything for this time essential in Russia wood policy will not be changed.



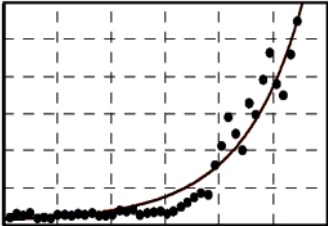
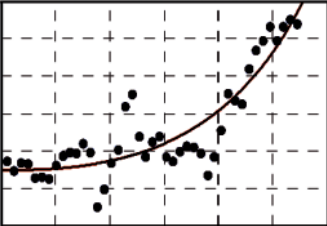
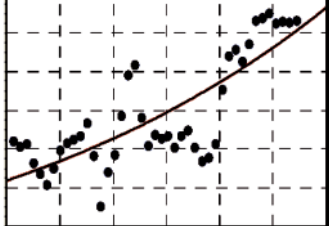
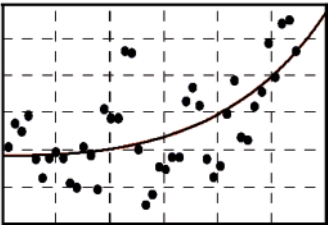
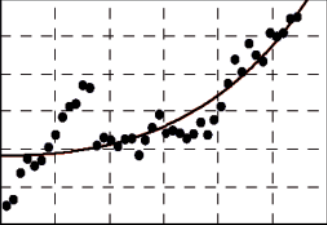
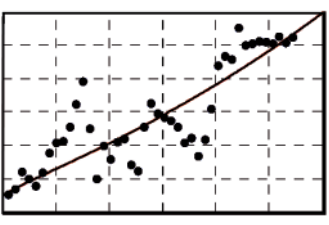
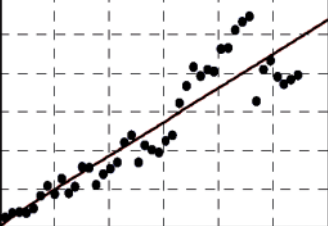
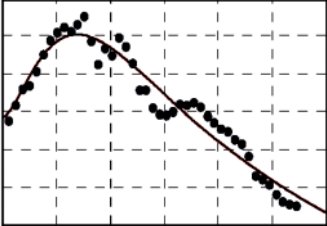
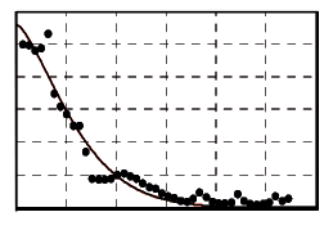
The proposed national long-term project «Russia: Forestry and Agribusiness» should not only totally change the shown above tendencies and regularities for Russia, and also for the Russian Federation separate subjects, but also to allow to install design dynamics of normative wood square growth parameters on each federation subject,

and also on each group of wood production – on sticks, saun wood, boards, paper and carton.

**Saun wood – technological country level parameter.** For a comparison on three processes of handling production (import, production and export) in table 6 data on world dynamics of sticks buck on saun wood are indicated.

Table 6

World dynamics of lumber-tally volume, m<sup>3</sup>

Import	Saun wood production	Saun wood export
Finland		
		
Sweden		
		
Japan		
		

The processes of handling saun wood show not only technological level of country (rough or at once fair sticks buck), but also reflect the humane or barbarous stance on wood, so and on growing wood, where from this mass of wood was extracted.

Some countries (Japan etc.) became to consider saun wood for **enriched raw wood**. Therefore noticeable saun wood production volume decrease in the world happens.

These semis as longitudinally sawn parts of sticks are used in main in construction and for want of furniture manufacturing. But also here replacement of sawn production by other kinds of not wood materials happens.

The main ecological tendency in the world is not only wood square decrease, but also essential growing tree quality decrease. In turn it conducts to a smaller output of saun wood from sticks volume unit. Some sawn production issue down-

turn rate constraining, for example in Japan, has supplied mass band mill introduction (Russia will have temporary profit on 15–25 of years) permitting to exclude a stage of **mechanical wood conversion** and by that considerably to reduce **refuse wood** – coom and par-ticle.

The world woods also will further be worsened, therefore chip and shredding (repeatedly crushed chip) will be converted all in large volumes and even more significant rates in the world junk wood will be atomized on fibrils. If all countries will begin to realize the programs of forestry, the wood arrays with qualitative trees will grow only to the beginning XXII century that is not less in 100 years.

The relentless logic of forestry in field of sticks back on sawn production as wood enrichment is those.

**Trend model of handling saun wood.** The statistical equations are of the form (import, productions and export of saun wood):

#### – Finland

$$V = 12300,00 \exp(0,019685t^{1,37751}); \quad (9)$$

$$V = 6713122,6 \exp(6,9084 \cdot 10^{-5} t^{2,46921}); \quad (10)$$

$$V = 3620997,1 \exp(0,018283t); \quad (11)$$

#### – Japan

$$V = 16,903 \exp(10,16373t^{0,073745}); \quad (12)$$

$$V = 28263505,0 \exp(-7,7708 \cdot 10^{-5} t^{2,41745}) + 1064675,9 t^{1,78953} \exp(-0,15473t); \quad (13)$$

$$V = 355897,7 \exp(-0,032114t^{1,44739}). \quad (14)$$

Each country has the features of import, production and export of saun wood. We will remark, that we offer to consider each subject of Russian Federation in a comparison with various countries, and consequently the behaviour strategy on sets and groups of Russian Federation subjects will be rather varied. Here we shall show only those distinctive features, which are characteristic for all 88 subjects of Russian Federation.

Best and have a superdistant perspective for all world the strategy is observed at Japan. It is necessary, on an extremely measure, three – four ten years of heavily reform of forestry to reach a modern level of Japanese management by woods. Japan sharply has reduced for past 44 years own production of saun wood, therefore naturally has reduced also their export, but not less sharply has increased import. It is the next technical and technological trap for Far East regions of Russia.

The point is it seems rather tempting to sell raw wood several more expensive by rough back on stock gangs of Siberian sticks. Cost will be much lower than cost of boards obtained on band mills of Japanese production. The wood policy will be played on it.

Japan has long ago converted own woods into national parks, and such situation all over the world will come rather soon, under our forecasts, already after a 2050 year (Kyoto Protocol was accepted in Japan it is not for nothing). However Russia can win on this protocol, if will liquidate public person conservatism (already four years Russia can not create the mechanism of use by advantages of Kyoto Protocol).

The saun wood are produced from sticks. It is quite natural and it is clear by all. Therefore it is necessary to determine the relation of lumber production volume to volumes of sticks dimension. Parameter of lumber volume relation to total volume of import and production, with a deduction from this sum of sticks export volume will be even more exact.

#### References

1. Mazurkin P.M. Wood and agricultural Russia and world dynamics of wood exploitation: scientific issuing / P.M. Mazurkin. – Yoshcar-Ola: MarGTU, 2007. – 334 p.

---

The article is prepared and is published for want of to 3.2.3/4603 MOH Russian Federation grant support.