ASERS

Journal of Environmental Management and Tourism

Quarterly
Volume IX
Issue 7(31)
Winter 2018
ISSN 2068 – 7729
Journal DOI
http://dx.doi.org/10.14505/jemt

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ASERS Publishing
http://www.asers.eu/asers-publishing
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DOI: http://dx.doi.org/10.14505/jemt.9.7(31).19

The Impact of Socio-Environmental Parameters on the Development of Children and Adolescents in Altai Republic

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Suggested Citation:

Voronkov, E. G., Voronkova, E. G. (2018). The Impact of Socio-Environmental Parameters on the Development of Children and Adolescents in Altai Republic. *Journal of Environmental Management and Tourism*, (Volume IX, Winter), 7(31): 1570-1576. DOI:10.14505/jemt.v9.7(31).19

Article's History:

Received October 2018; *Revised* November 2018; *Accepted* December 2018.

Abstract:

The problem of creating an environmentally friendly biosphere-compatible environment is one of the most acute. Therefore, the paper analyzes the impact of socio-hygienic parameters on the environment. To achieve this goal, the authors carried out a survey, which allowed to determine the impact of the quality of life on the younger generation and, accordingly, on the environment. It is known that the comfort of the climate, height above sea level, eastern longitude and latitude also affect the environmental component. It has been established that nutrition, as a hygienic indicator, is directly related to environmental pollution. Since the food industry is one of the main industries in the Altai Territory. The food industry is directly related to environmental issues as follows. It has been established that among the various factors of socio-economic nature that affect the growth and development of children, the level of average per capita income per family member is of great importance. Which are indicators of the quality of life of the population. And the influence of this population on the components of the environment.

Keywords: hygienic indicators; quality of life assessments; food waste management; sanitary and epidemiological requirements.

JEL Classification: I10; Q19.

Introduction

Modern environmental problems of a person unfold against the background of a change in the links between nature and the social essence of man. A large number of negative anthropogenic factors affect the natural basis of a person. Such a situation is dangerous in that the human body does not have an evolutionarily prepared reaction standard, which is the cause of many diseases (Coppolillo 20126 373; Bettez *et al.* 2015, 1320).

When considering the problems of human ecology, a population approach is often used, based on fertility, mortality, development, adaptation, and allowing to successfully solve social and economic issues in a particular region. The presented paper describes hygienic indicators that influence the development of environmental strategies (Yunusov 2015, 44; Braun 2018, 81-83; Amorim *et al.* 2018, 1-11).

The particular complexity of the problem "ecology and children's health" lies in the multifactorial effect on the children's organism. These include hereditary ethnic characteristics, ante-and perinatal factors, the harmfulness of production of parents, the quality of the microenvironment of residence, alcohol consumption and

smoking, social instability and economic insufficiency. The combination of influences can screen or, conversely, increase the negative impact of environmental factors. All these influences are manifested in varying degrees in rural areas and cities, which may have different effects on the state of body functions and the health of rural and urban children and adolescents.

Hygienic features also affect the ecological development of the region. According to the Russian Public Health Organization, the quality of nutrition is in the first place in the sustenance of a person. Food substances fully provide physical and mental performance, determine the health and quality of life, the appearance of a person living in a given area. Proper (rational, balanced) nutrition, along with equal physical costs, is one of the main factors for maintaining health and preventing diseases (Wilms 2016, 11; Beletskaya and Gromova 1983, 18).

Since September 2008, in the territory of the Russian Federation, new sanitary and epidemiological rules and standards have been introduced for the organization of catering for students – SanPinN 2.4.5.2409-08 "Sanitary and epidemiological requirements for the organization of catering for students in general education institutions, primary and secondary professional education" (Teherikova and Kudirmekova 2012, SanPiN 2.4.5.2409-08).

1. Materials and Methods

To determine the influence of socio-ecological conditions on the formation of the development of the younger generation, both theoretical and experimental methods were used. The survey allowed us to determine the assessment of the quality of life, which directly affects the environmental component.

The research program included a questioning of parents, whose children belong to the primary school and the secondary school link, and high school students. Participants were offered a questionnaire "Methods for assessing the quality of life", developed by the Research Institute of Hygiene and Health of Children and Adolescents of the National Center for Occupational Safety and Health of the RAMS, State Research Institute of Military Medicine. In total, 1,166 children participated in the survey and submitted for analysis. On the national basis, the composition of the respondents was distributed: Russians – 419, Altaians – 306, Half-caste – 137 and 304 children could not determine their nationality, so in the statistical treatment this group was present under the name as unknown. For the analysis, all the questions of the questionnaire were taken. Besides this in the analysis included variables describing the climate comfort, the height above sea level, east longitude and north latitude. The main emphasis in connection with the stated topic was also on questions that directly related to the structure of nutrition. Their wording and variants of the answers are given in the tables of correlation links and the text of the work.

In processing the data obtained, the authors relied on the STATISTICA 10 package. They used a number of statistics to answer the set goals and objectives. To search for pairings with the power structures and socio-hygienic aspects of the children surveyed, where a number of attributes contains many duplicate values, applied gamma correlation. As a comparison criterion the average values for the independent groups in the analysis of family budgets was used criterion Kraskela-Wallis (Kruskal – Wallis test). In addition, to reduce the dimension of the analyzed attributes interpretation of data with moderate and strong correlation linkage was carried out using correspondence analysis (Correspondence Analysis). This statistic contains descriptive and exploratory methods for analyzing two-input and multi-input tables. These methods allow us to study the structure of the grouping variables included in the conjugacy frequency table. One purpose of correspondence analysis – representation of the relative frequencies of the contents of the table as distances between the individual rows and/or columns of the table in the space of possibly lower dimension (Khalafyan 2007, 333-337). At the same time, the analysis of correspondences, which greatly simplifies the data representation, allows not to lose a single bit of the initial information, providing a simple in form but comprehensive and exhaustive analysis.

2. Results and Discussion

It is well-known that poor social and hygienic conditions contribute to the progression of the negative influence of environmental factors on the population. The main strategic goal of socio-hygienic research is to study the relationship of demographic, social, economic, environmental processes in society with the development of public health, the prevalence of pathology, life expectancy of people, which requires knowledge of the entire life flow expressed in the alternation of human generations.

A new paradigm of social and hygienic research is being formed, which combines the biological, social, economic values of the population into a single criterion for the development of society – human capital (NR),

where the nature of generating the income stream in the form of the reproduction of health of new generations is established.

In this regard, it is necessary: prioritizing social and hygienic research, justifying the synthesizing and integrating role of social hygiene in comprehensive medical research, and developing indicators and criteria for human capital (health capital) as an element of interaction with other sciences. Based on the Gamma analysis Correlations, the relationship between socio-hygienic parameters, reflecting the quality of life, the structure of nutrition, etc. are shown in Table 1. The selected font shows the values that indicate statistically reliable correlation links with a minimum threshold of reliability level $p < 0.05$.

It can be seen that the questions of the questionnaire reflecting structure of nutrition, show different closeness of connection with the rest of the set of social and hygienic issues. Bearing in mind that the correlation is weak at $r < 0.25$, in the range $0.25 < r < 0.75$ – moderate, at $r > 0.75$ strong, and strong correlation means that the relationship between the variable and may be close to linear (Rebrova 2002, 18-23).

Table 1. Matrix of correlation of quality of life of children and adolescents of the Altai Republic with hygienic aspects and structure of nutrition

Questionnaire questions	How many times a day does your child usually eat	How many times a day does your child usually use hot food	Does your child regularly eat meat, fish, eggs	Does your child regularly eat dairy products	Does your child regularly eat vegetables, fruits
Gender	-0.18	-0.17	0.01	-0.17	0.04
Place of residence (School)	-0.10	-0.16	-0.32	-0.07	-0.24
Time lived in this territory	0.07	0.11	0.09	0.11	0.13
Number of family members	-0.21	-0.12	-0.06	-0.08	0.05
Family budget	0.19	0.13	-0.24	-0.04	-0.35
Inhabitancy conditions	0.06	0.00	-0.18	0.00	-0.10
Diseases	0.15	0.07	0.08	0.05	0.05
Friends	0.02	0.04	0.02	-0.0 1	-0.07
How many times a day does your child usually eat	1.00	0.71	0.35	0.32	0.13
What is the length of stay in the air (on average, per day) on your child's school days	0.37	0.22	0.13	0,15	0.13
The length of preparation of lessons for your child	0.07	0.02	-0.02	-0.05	0.03
How much time per week does your child spend on systematic additional activities (electives, music, other activities)	0.24	0.31	0.16	0.10	-0.03
Does your child do morning exercises	0.07	0.01	-0.03	0.07	0.0 6
Subjectively assess the sufficiency of your child's daily physical activity	0.19	0.12	0.06	0.21	0.16
Is it accepted in your family to smoke	0.10	-0.05	0.03	0.16	0.01
Is your family taken to drink alcohol	0.07	0.02	-0.10	0.07	0.07
Age	0.22	0.16	0.08	0.06	0.12
Nationality	0.28	0,15	-0.04	-0.02	-0.27
Height above sea level (points)	-0.21	-0.02	0.14	-0.03	0.34
North Latitude (points)	0.18	0.06	-0.06	0.05	-0.28
Eastern Longitude (points)	-0.24	-0.17	-0.09	-0.02	0.17
Climate comfort (points)	0.24	0.08	-0,11	0.02	-0.35

Thus, our calculations indicate, that this is a nonlinear relationship in which there is no simple cause-effect relationship. Thus, looking at the first column of the table, you can find that only the frequency of food intake is strongly correlated with the frequency of receiving hot food. Next, the strength of the connection frequency of food intake and moderately correlated with the duration of stay in the air, the frequency of eating meat, fish, eggs, dairy

products, nationality and relationships in the family. However, if we turn to the textbook on applied statistics (Aivazyan and Mkhitaryan 2001, 438-439), then about the gamma correlation there can be found approximately the following. For moderately large values of the sample size and provided that the absolute values of the rank correlation coefficients are not too close to unity, the coefficient of gamma correlation is 1.5 times smaller than the value of the Spearman correlation. Then the boundaries for strong correlation bonds can be considered 0.5, and for weak 0.2. Consequently, the correlation links found in the work can be interpreted as strong. (Vinyarskaya 2008)

Not taking into account a reliably weak correlation, one can see that from a whole range of questions that determine the quality of life, the frequency of food intake by children from the areas of the southern, central Altai and partly its northern province, is determined by a variety of factors. In more detail, we will dwell on those factors that show strong and moderate positive connections. First of all, let's pay attention to the ratio of "frequency of food intake" and "frequency of hot food". 56.64% of children from the surveyed areas eat four or more times; 27.35% in the regime of three to four times; 14.90% twice and 1.11% once, respectively. At the same time, 42.44% of children with 2-3 meals a day, take hot food; 10.24% – 3-4 times; 37.86% 2 times and 9.46% only 1 time respective.

Moderate positive correlation between the amount of consumption of hot food per day and such signs as the frequency of eating meat, fish, eggs; relationships in the family; the duration of a night's sleep; additional classes; frequency of eating fruits and vegetables; dairy products and training load, can be seen in the second column of Table 1. In turn, the regularity of eating meat, fish, eggs, in addition to the already noted links, moderately correlates with the frequency of eating dairy products, vegetables and fruits; relationships in the family; the duration of a night's sleep. Here we should point out a moderate negative relationship between the place of residence and the frequency of consumption of meat, fish, eggs. Similar relationships are noted in the frequency of consumption of dairy products, with moderate strength ($r = 0.2553$), and a subjective evaluation of the weekly training load. The last of the proposed characteristics of the frequency of eating fruits and vegetables, with the links described above, is still related ($r = 0.2776$) with personal hygiene. In addition to the actual food interconnections in the structure of nutrition, it is worth paying attention to the relationship pointing to the relationship in the family.

Despite the absence of direct statistical links between the family budget and the family size in the submitted data, we could not ignore this issue even on the grounds that significant attention was paid to this problem in world practice. So in V.E. Derjabin's work it is possible to find literally the following. Among the various factors of socio-economic nature that affect the growth and development of children, the level of average per capita income per family member in which they live is of great importance. In carrying out this kind of research in most groups of children living in different countries, including those differing in economic development level, a significant positive effect of higher incomes on the rate of growth and development was observed. In world practice, the share of food expenditures in the family budget is used as one of the general indicators of the standard of living: the lower this proportion, the higher the standard of living of people. The tendency of the drop in the share of food expenditures in the total amount of consumer spending as incomes increase indicates an increase in the standard of living.

The civilized structure of expenses assumes expenses for a food in volume no more than 15% of the family budget. At present, even in the well-off strata of the Russian population, these expenditures amount to about 30%, and in the majority of family's food products take away more than 60% of the budget (Gorshenina 2011, 58-60).

A certain relationship with the patterns of growth and development of children is the size of the family in which they live. A significant increase in the number of children in the family is associated with a decrease in their body size and a delay in puberty. Calculations of the statistical significance of the quantitative composition of families from the surveyed settlements (Kruskal-Wallis test: $H (13, N = 676) = 80.42116$, $p = 0.0000$) also indicates non-equality of means. At the same time, considering the data of Table 2, it can be seen that the greatest contribution was significantly recorded among the inhabitants of the Kosh-Agach region in comparison with the Ongudaysky and Maiminskys. The families of the Ongudai district also outnumber the families of the Mayminsky district by their quantitative composition.

Thus, according to statistical data (Tables 2) it is clear that the further the district is located from the republican center, the higher the number of families and the lower the budgetary support in this region.

Guided volumes of food consumption, recommended by the Institute of Nutrition and this, after spending some simple calculations (data in table 2), it can be concluded that only for the purchase of basic food groups at their average market price for the period 2010-2012, for example, in Kosh-Agach region will require approximately 22034.15 rubles. In addition, there are settlements in this area, where the average number of family members per unit is higher, than the average for the district: village Ortholyk.

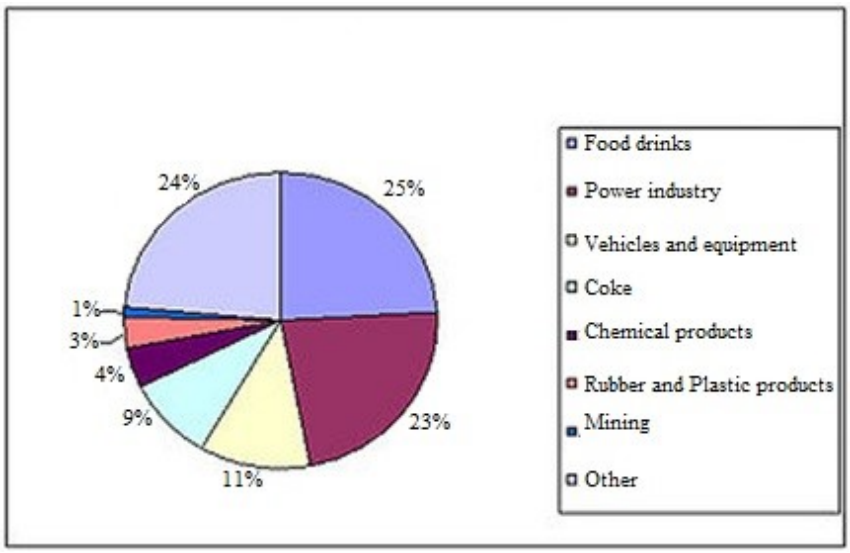
Table 2. The quantitative composition of the family of the surveyed settlements and district centers (Wilms 2016, 15; SanPiN 2.4.5.2409-08; Agafonov 2017)

Place of examination	Means	Std.Dev.	Wald-Wolfowitz Runs Test
Gorno-Altaisk No 8	3,80	1,00	0,001; 0,01; 0,05
Elo	4,54	1,81	0,05
Kyzyl-Ozek	4,22	1,17	0,001; 0,05
Kulada	4,83	1,34	0,05
Maima №1	4,11	1,14	0,001
Maima №3	3,94	0,90	0,001; 0,05
Mukhor-Tarhata	5,43	1,80	0,001; 0,05
Nowyj Beltir	4,77	1,39	0,001; 0,05
Ongudai	4,29	1,16	0,001; 0,01
Ortholyk	6,40	2,59	0,001; 0,01
Paspahul	4,69	1,41	0,05
Tenga	4,48	1,12	
Chibit	4,41	1,12	
Chagan-Uzun	4,71	1,08	
All Grps	4,39	1,34	
Kosh-Agach district	5,19	1,7	0,001
Ongudaysky district	4,37	1,23	0,001
Maiminsky district	4,12	1,12	

Note: p <0.001 difference between Kosh-Agach and Mayminsky districts; p <0.001 differences between the Kosh-Agach and Ongudai districts; p <0.001 differences between the Ongudaysky and Mayminsky districts.

One of the hygienic indicators is the level of air pollution. More than 80% of the population living in urban areas that have an established air quality monitoring system are exposed to air pollution that exceeds the limits set by WHO. To determine which industrial activity affects the ecology of the Altai Territory, the authors analyzed.

Figure 1. The structure of the industry of the Altai Territory (2006)



Source: Compiled by the authors.

From Figure 1 it can be seen that the food industry takes up the bulk of the industry. In terms of the degree of intensity of the negative impact of food industry enterprises on environmental objects, water resources occupy the first place. In terms of water consumption per unit of output, the food industry occupies one of the first places among the branches of the national economy. The high level of consumption causes a large amount of wastewater in enterprises, while they have a high degree of pollution and pose a risk to the environment. Discharge of sewage into water bodies quickly depletes oxygen reserves, which causes the death of the inhabitants of these bodies of water.

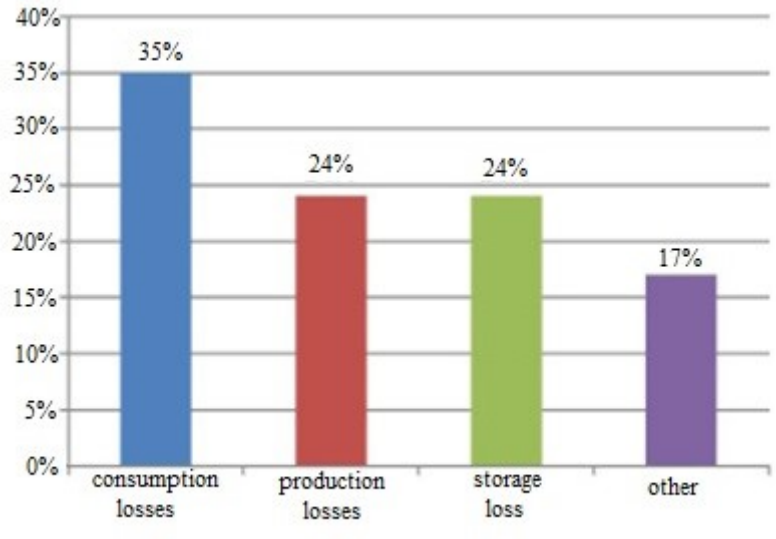
In the production of food products and the tasteless sugar-free industry, for example, the production of chewing gum, wastewater contaminated with a large amount of sugar substitutes (sugar alcohols, aspartame) is formed. Also in the waste water are aromatic substances, such as menthol.

The food industry has a direct relationship to environmental issues as it has recently been talking about the production of environmentally friendly products. Intensive processing and high volume of the processed product cause potential environmental impact. Specified to a large extent applies to the wine and vodka industry. The food industry is characterized by the formation of a large amount of waste at a preliminary stage before the start of the main processing in the form of soluble organic substances. Even in small seasonal enterprises, the volume of waste reaches volumes corresponding to a population of 15,000 to 20,000 people, whereas in large factories the volume of waste is equivalent to that of a population of a quarter of a million people. If the amount of waste emitted with steam or water is not large, and the volume of organic waste is huge, then organic waste binds dissolved oxygen and turns into stable compounds. This waste can pollute or cause damage to water bodies by reducing the concentration of dissolved oxygen to a value below that necessary for the existence of ordinary aquatic organisms. In most cases, food waste is subjected to biological treatment.

To solve this problem, it is necessary: to ensure the production of high-quality and environmentally friendly food raw materials, improve existing and develop new, including waste-free and environmentally friendly food technology.

For enterprises involved in the processing of food, the problem of storage and disposal of waste is most often solved by organizing the place of storage of waste and their subsequent export. However, there are a number of solutions to control the volume of waste, reducing their volume to a minimum or even completely eliminating it.

Figure 2. Food losses



Source: Compiled by the authors.

In the modern world, 1/3 of all food becomes food waste, which is about 1300000000 tons of food, which spoils or is thrown away before it is consumed. Figure 2 shows the food losses that affect the environment.

Conclusions

The article analyzes the interdependence of food products and their impact on the environment. The quality of the environment is rationed in order to establish the maximum permissible norms of environmental impact, which guarantee the environmental safety of the population and the preservation of the genetic fund, ensuring the rational use and reproduction of natural resources in the context of the sustainable development of economic activities. It has been established that the main strategic goal of social and hygienic research is to study the relationship of demographic, social, economic, ecological processes in society with the development of public health, the prevalence of pathology, life expectancy of people, which requires knowledge of the entire life flow expressed in the alternation of human generations. The food industry has an environmental impact during production and consumption.

It should be noted that as an enterprise affects the environment, the environment can also affect an enterprise. For example, the creation of public trust among citizens can significantly increase the economic opportunities of an enterprise. If the atmosphere, soil, and water continue to be mercilessly polluted, then in the future raw materials for production will grow of worse quality. It can be said that there is a direct relationship between nature and industry. Do not mindlessly pollute the environment, because through a very complex biological-chemical mechanism, the environment will affect both the profit of the enterprise and its fixed assets.

Acknowledgment

This work was carried out with the financial support of the RFBR (grant numbers: 10-06-00318-a, 10-06-02104 e_k, 11-06-10015-k.

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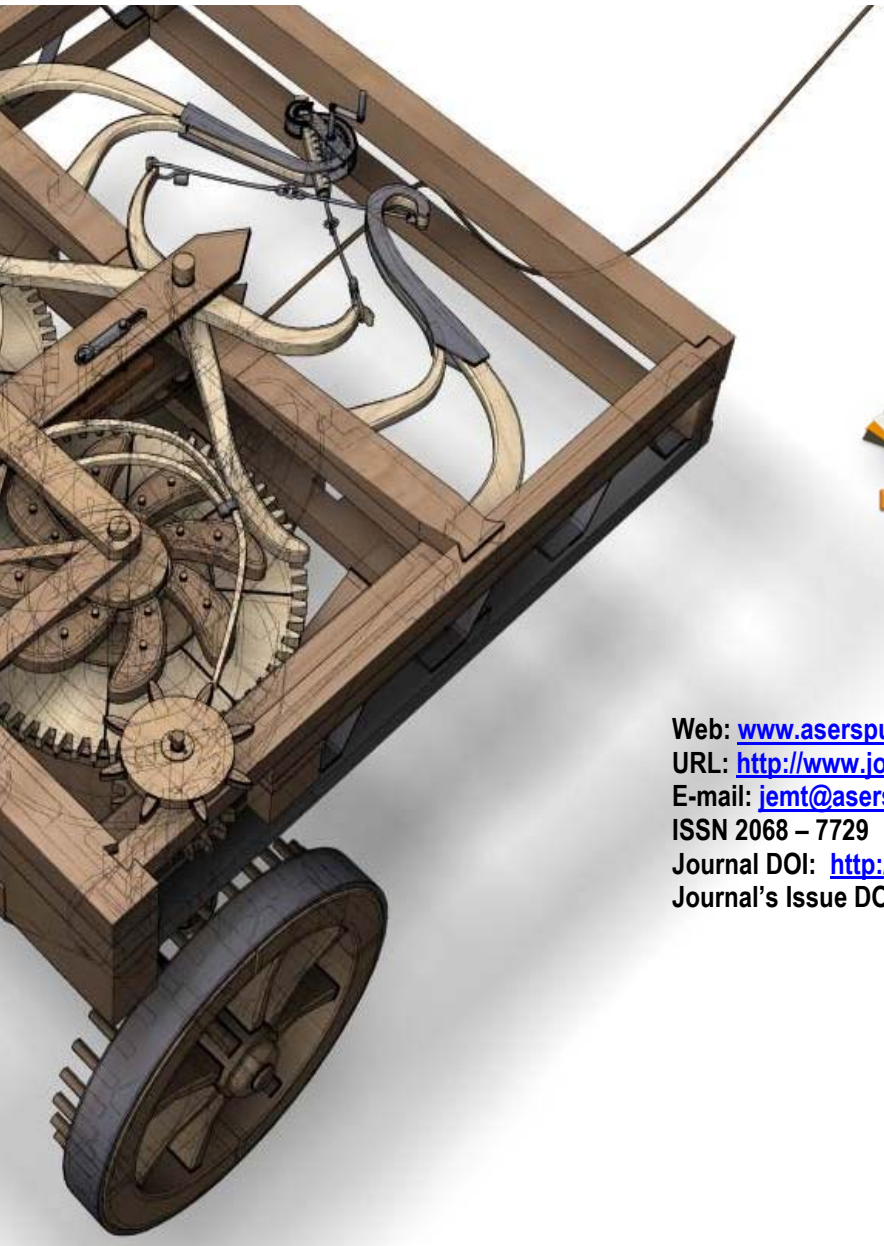

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