ASERS

Journal of Environmental Management and Tourism

Quarterly
Volume XIII
Issue 5(61)
Fall 2022
ISSN 2068 – 7729
Journal DOI
https://doi.org/10.14505/jemt

ASERS Publishing

Fall 2022
Volume XIII
Issue 5(61)

ASERS Publishing
http://www.asers.eu/asers-publishing
ISSN 2068 – 7729
Journal DOI: https://doi.org/10.14505/jemt

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Volume XIII
Issue 5(61)

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DOI: https://doi.org/10.14505/jemt.13.5(61).16

Solid Waste Collection Service Satisfaction in Non-Service Area of Jigawa State, Nigeria

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Suggested Citation:

Aminu, M. (2022). Solid Waste Collection Service Sati sfaction in Non-Service Area of Jigawa State, Nigeria. *Journal of Environmental Management and Tourism*, (Volume XIII, Fall), 5(61): 1407 - 1415. DOI:10.14505/jemt.v13.5(61).16

Article's History:

Received 24th of April 2022; Received in revised form 31st of May 2022; Accepted 3rd of August 2022; Published 2nd of September 2022.

Abstract:

The absence of a sound solid waste collection services poses a major challenge for the residents and local authority in Jigawa State. Providing solid waste collection services remain a distant hope, mainly because local authority could not provide the services to the region. Solid waste collection is concentrated only in the capital Dutse, where other local authority areas are without collection services, therefore, the risk of the region to uncontrolled waste disposal is high. The objective of the study is to examine the satisfaction with solid waste collection service in non-service areas of Jigawa State, Nigeria. Quantitative technique was used in data collection, and the questionnaire was designed based on a 5-Likert scale to study solid waste collection service satisfaction among the resident's. The instrument was validated by 8 panel of experts selectively drawn from academia and local authority with the reliability of the instrument standing at 0.846, which is worthy enough for the instrument to be accepted.and simple random sampling method were used to select respondents. With population of 37,281 households, the recommended sample is 394 at a 95% confidence level. In addition, 10% of the calculated sample was added to round it up to 433 households selected for the study, where the multistage sampling technique was used to administer the questionnaires to the respondents. The data was analyze using SPSS (IBM 25 version), descriptive statistics with frequency and percentage, then illustrated and interpreted. The findings revealed that 283 (74%) of the respondents were satisfied with the level of household participation in solid waste collection, 248 (65%) of the respondents reported being satisfied with the cleanliness of the non-service area done by the non-residents. 231 (60%) were satisfied with collection frequency. On the other hand, 219 (57%) were not satisfied with the absence of waste collection service, a weak percentage 10 (3%) of the respondents were very not satisfied with the collection services by the non-residents. The study suggest that although solid waste collection services provided by the non-residents are somewhat acceptable, there is much room for improvement on the part of the local authority to enhance the system. Planning and policy implementation as well as institutional and legal framework is required for optimum integration of non-residents in to formal waste collection, this is very crucial to ensure efficient service delivery and satisfaction to non-service areas.

Keywords: residents; solid waste collection; satisfaction; non-residents; non-service area.

JEL Classification: Q53; Q56; R11.

Introduction

Solid waste collection become a major global concern for most cities of developing countries (Patwa *et al.* 2020). Low collection rate and inefficient collection services are very common in most African cities (Cetrulo *et al.* 2018). Low-income residential areas are the worst affected by irregular solid waste collection services (Rodney and Sydney 2012; Senekane *et al.* 2021). Insufficient solid waste collection services is strongly associated with the existence of accidental settlements in the metropolis (Mamady 2016). Narrow roads, badland topography resulting from poor urban planning accentuated the problem (Nabegu 2017), distance limitation is also an issue.

The absence of appropriate solid waste collection services pose a serious challenge for the residents and local authority in Jigawa state. The region has 27 local authority areas, each with no define solid waste collection system, except Dutse, the capital, other 26 local authority areas are without collection services. This fact point to the existence of a critical gap in solid waste management, which favors the presence of aboriginal solid waste collection system.

The local authority constitutes all-inclusive the core provider of municipal solid waste management services either directly or indirectly through subcontracting part or all of the services (Christo and Kafia 2009). However, the reverse is the case; in non-service areas as local authority could not provide the services to the region, which led to the evolution and integration of non-residents in solid waste collection services.

Therefore, lack of solid waste collection services is a serious problem in the region and most of the inhabitants dump their solid waste in an open dumpsite (Aliu *et al.* 2014). The consequent effect is pollution of both air, land, soil and contaminate drinking water sources Shomoye and Kabir (2016). Earlier studies (Olukanni *et al.* 2016; Ogechukwu and Emeka 2020; Adeniran *et al.* 2017; Ezeah and Roberts 2012; Oguntoyinbo *et al.* 2013) highlighted other problems include inefficient collection system and insufficient collection coverage, inadequate environmental regulations and legislations, poorly trained waste workers among others. Kadafa *et al.* (2014) reported that influencing factors ranging from inadequate workforce, high fee, poor vehicles and unplanned districts.

The inefficient solid waste collection service is a sign of city planning problem in many African cities (Loukil and Rovached, 2020), in adequate municipal solid waste collection posed a severe health risk in China (Chu *et al.* 2013), Adeyi and Adeyemi (2019) in Nigeria. Solid waste collection is not a well develop practice in the region, the residents practice indigenous system with outdated equipment due to the absence of authority support. Thus, absence of solid waste collection service remains a critical challenge for the local authority and residents Therefore, the aim of the study is to examine solid waste collection service satisfaction among the residents in non-service areas of Jigawa State, Nigeria.

1. Research Methodology

The research employed a quantitative technique to collect data for the study, the questionnaire was designed based on a 5-Likert scale to investigate residents' satisfaction with existing solid waste collection services. The questionnaires were validated by a panel of 8 experts from the academia and local authority for simplicity, generality and appropriateness for data collection, while the reliability of the instrument stood at 0.846, which is good enough for the instrument to be accepted.

The instruments consisted of three parts, (i) the Introductory part of the questionnaire (ii) the demographic characteristics of the respondents (iii). Resident's satisfaction (11items). The residents satisfaction were measured based on the extent to which they were satisfied with solid waste collection services on a 5-points Likert scale representing very not satisfied, not satisfied, Neutral, satisfied, very satisfied.

1.1. The Study Area

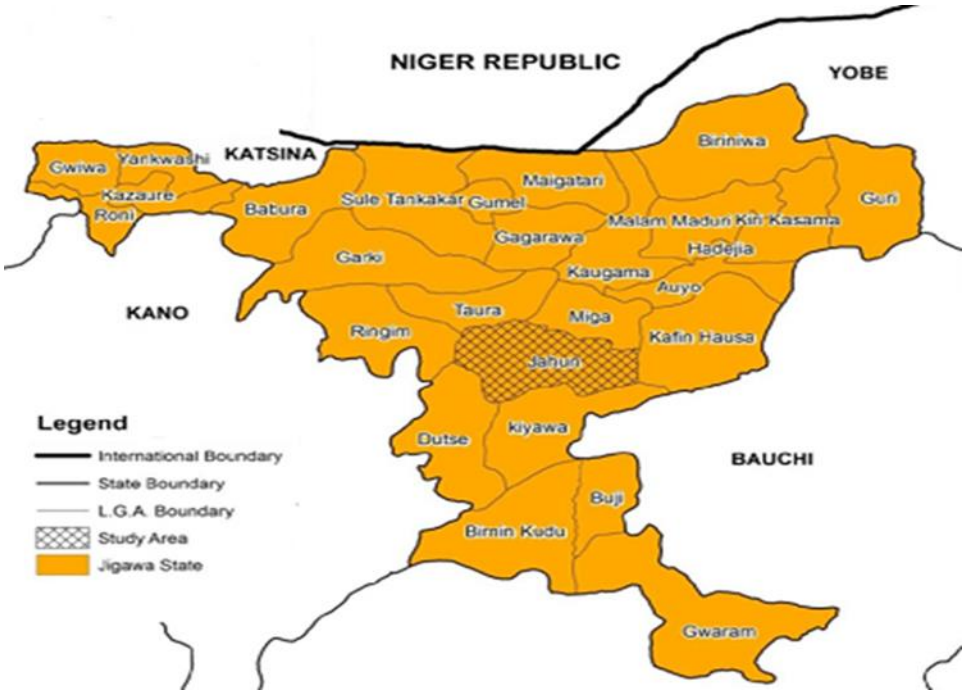
The study area is Jigawa State, Northern part of Nigeria as shown in Figure.1. It is located between 11^0N-13^0N and 8^0 E-35^0E. It has a total land area of 22.410km^2 and is rim by Kano and Katsina States to the west, Bauchi to the east and Yobe to the northeast with a population of 5.828,202 (National Bureau of Statistics 2016). According to Rislan *et al.* (2016), the state has a GDP of $2,988 million and is ranked 32 among the Nigerian states.

The land-use pattern was initially residential and agriculture with available land for various land use. As time went on, considerable changes in land use have occurred. An increase in population and urbanization due to rural-urban migration generates very severe stress on available land, resulting in competition and other associated problems (Mansur and Muhammad 2016).

The socio-economic activities of the dwellings include trading, fishing and agriculture with a greater portion of the population engaged directly in agriculture, cultivating different types of crops such as cassava, rice, maize, sugarcane, millet, wheat, guinea corn, date palm, tomato, peppy, melon and animal husbandry among others

Solid waste management is not a well-developed practice, and the collection system is still at a very elementary level, bearing in mind the low priority accorded to the system. However, due to poor waste management, the disposal is mostly along gullies to control the menace of erosion (Mansur 2015). The absence of an authorised disposal site aggravates the problem (Kazaure, 2016).

Figure 1. Map of Jigawa State



Source: Akfayi *et al.* (2015)

In essence, the entire management of solid waste is directly under the control of JISEPA. Unfortunately, efforts to reach the non-service areas through this agency, for waste collection proved very difficult due to it associated problems. It is therefore, compulsory for households in non-service areas to manage their waste, since JISEPA could not efficiently manage solid waste. Hence, the integration of non-residents became necessary to collect solid waste. This may serve as a benchmark for the urban authorities responsible for solid waste management for whom the issue is still indiscernible and unimportant.

1.2. Sampling Technique

The respondents of this study are the residents living within the non-service areas of Jigawa State, because the residents have a background knowledge of the region and solid waste collection system carried out by the non-residents. Thus, the survey was confined to non-service areas, based on the geographical entity of the study area, the non-service areas are not close to each other. Therefore, in order to ensure that the respondents have an equal chance of been selected in the sample for the study, a simple random sampling method was used to select (9) non-service areas. The questionnaires were then; administered to the selected respondents using a multi-stage sampling technique.

1.2.1. Selection of Respondents

As at the time of the survey, the population of the study comprised 37,281 residents, and therefore, the recommended sample is 394 based on Isreal, (2012), criteria for sample size selection. However, 10% of the sample was added to round it up to 433 in case of non-response and missing instruments. Similarly, the questionnaire was then, administered to a sample of 433 respondents. The sample was calculated proportionally using a simplified formula put forward by (Krejcie and Morgan, 1970), for instance.

$$s=X^2NP\ (1-P) \div d^2(N-1)+X^2P\ (1-P) \qquad 1.1$$

Where

S = required sample size.
X^2 = the table value of chi-square for 1 degree freedom at the desired confidence level.
N=Population size.
P= the population proportion.
d =degree of accuracy expressed as a proportion.

Therefore, simple random sampling was used to select three non-service areas from each of the three Senatorial Districts (Jigawa Central, Northeast and North-west senatorial districts) in order to have equal representation as suggested by Taherdoost, (2016), to ensure the respondents have an equal chance of being selected in the sample for the study. Following this technique, Gwaram, Jahun and Birnin kudu were selected to represent Jigawa Central. However, Hadejia, Kafin Hausa and Malam madori were chosen to represent North-East Senatorial District, Kazaure, Ringim and Babura North-West Senatorial District, respectively. The sample was therefore, divided proportionally to the respondents according to the population of each non-service area as shown in Table 1.

Table 1. Sample sizes distribution in the three Senatorial Districts.

S/N	Jigawa Central	Population	Sample size
1.	Birnin Kudu	5,253	61
2.	Jahun	4,601	53
3.	Gwaram	3,800	44
	NorthEast Senatorial District		
1.	Kafin Hausa	3,429	40
2.	Hadejia	8,234	96
3.	Malama Madori	2,744	32
	Northwest		
1.	Babura	3,500	41
2.	Ringim	2,929	34
3.	Kazaure	2,791	32
	Total	37,281	433

1.3 Data Collection

Data was collected from the respondents using a questionnaire. The questionnaire was self-administered at the doorstep of the respondents. The instrument was administered to a sample of 433 respondents. However, 423 completed copies of the questionnaires were returned, representing 97.2%, which was efficient for the analysis.

1.4. Data Analysis

The results were analysed using Statistical Package for Social Science (SPSS IBM 25 version), descriptive statistics with frequency and percentage, and then illustrated and interpreted.

2. Results and Discussion

The demographic characteristics of the residents are presented in Table 2.

Gender

More than half of the respondents, 328 (85.6%) were male and 55 (14.4%) were female. This showed the response cut across gender, and male households headed the majority of the residents, as men are the breadwinner of the family in Jigawa, and have a greater sense of responsibility.

Age

The Age distribution of the respondents showed that 136 (35.5%) were within the range of 31-40 years, 94 (24.5%) had 41-50 years, 78(20.4%) were within 21-30 and 65 (17.0%) 51-60 years of age respectively. Only 10 (2.6%) were above 60 years.

Marital status

Residents reported high marital status 361(94.3%) were married, 9 (2.3%) were divorced, 8 (2.1%) single and 5 (1.3%) were widows.

Resident's size

In terms of average resident's size, 119(31.1%) had a family size of 4-6, 101(26.4%) had between 7-9 families, while 98 (25.6%) had 1-3 family size. Furthermore, 62 (16.2%) had above 10 persons. The highest residents; size in the study area range from 4-6 people per household and followed by 7-9 people.

Highest educational status

Most of respondents had college education certificate 133 (34.7%) obtained bachelor's degrees, and 140 (36.6%) Diplomas qualification, 40 (10.4%) acquired Qur'anic education and 37(9.7%) secondary school certificates, 15 (3.9%) primary school certificates. While 11(2.9%) have Master/Ph.D., only 7 (1.8%) with no formal certificates.

This indicates that there is considerable number of educated people in non-service areas when all forms of education were combined from Primary to higher institution.

Table 2. Demographic Profile of the Residents

		Frequency	Percentage
Gender	Male	360	85.1
	Female	63	14.9
Age	21-30	83	19.6
	31-40	147	34.8
	41-50	108	25.5
	51-60	71	16.8
	Above 60 Years	14	3.3
Marital Status	Single	8	1.9
	Married	401	94.8
	Divorce	9	2.1
	Widow	5	1.2
Resident size	1-3	106	25.1
	4-6	126	29.8
	7-9	118	27.9
	Above 10 person	73	17.3
Highest Educational Level	No formal education	10	2.4
	Primary School	15	3.5
	Secondary School	39	9.2
	Qur'anic Education	47	11.1
	Diploma	148	35.0
	Bachelor	149	35.2
	Master/PhD	15	3.5
Employment Status	Government	144	34.0
	Private Sector	102	24.1
	Self employed	72	18.2
	Unemployment	100	23.6
Monthly Residents Income	Below 30,000 Naira	159	37.6
	31,000 – 60,000	114	27.0
	61,000 – 90,000	84	19.9
	Above 90,000	66	15.6
Collection service payment/day	70 Naira	293	69.3
	71-80 Naira	39	9.2
	81-90 Naira	21	5.0
	91-100 Naira	35	8.3
	Above 100 Naira	35	8.3

Employment status

At least 140 (36.6%) of the respondents were employed with government, 91 (23.8%) in private sector. Similarly, 90 (23.5%) were unemployed, and 62 (16.2%) were self-employed.

Monthly Residents income

The surveyed residents reported 143 (37.3%) had a monthly income of below 30,000 Naira, 107 (27.9%) had 31-60,000 Naira. 72 (18.8%) had 61-9000 Naira, while 60 (15.7%) had above 90,000 Naira.

Collection service payment

A high percentage of the respondents, 256 (66.8%) paid 70 Naira for solid waste collection, and 39 (10.2%) paid 71-80 Naira. On the other hand, 34 (8.9%) paid 91-100 Naira. Only 33 (8.6%) paid above 100 Naira.

2.1 Residents Satisfaction with Solid Waste Collection Services

Regardless of whether they have access to waste collection service or not. Survey respondents reported 283 (74%) of the respondents were satisfied with the level of household participation in solid waste collection. 248 (65%) reported being satisfied with the cleanliness of the non-service area done by the non-residents, 231 (60%) were satisfied with collection frequency in my area. However, 229(60%) were satisfied with collection service by the non-residents in my area. 223(58%) were satisfied with the schedule time for waste collection, with 205 (54%) were satisfied with joint collection system in the non-service area.

Findings showed that a very low percentage 8 (2%) were very not satisfied with the level of household participation in waste collection. At least, 10 (3%) of the respondents were very not satisfied with the collection service by the non-residents.

Table 3: Residents level of Satisfaction on solid waste collection. Respondents were asked to indicate the level of satisfaction with the existing solid waste collection service. Below is the summary of their responses in table 3

Table 3. Residents level of Satisfaction on solid waste collection

S/No	Statement	*Very satisfied*	*satisfied*	*Neutral*	*Not satisfied*	*Very not satisfied*
1	I'm not satisfied with the absence of waste collection service in my area.	17(4%)	24(6%)	46(11%)	219(57%)	126(30%)
2	I'm satisfied with joint collection system in the non-service area.	58(13%)	205(54%)	50(12%)	59(14%)	26(6%)
3	I'm satisfied with the role of non-residents in waste collection activities.	66(16%)	258(61%)	48(11%)	42(10%)	17(4%)
4	I'm satisfied with collection service by the non-residents in my area.	47(11%)	229(60%)	42(10%)	59(14%)	10(3%)
5	I'm satisfied with collection frequency in my area.	39(9%)	231(60%)	83(19.6%)	77(18%)	23(5%)
6	I'm satisfied with scheduled time for waste collection.	47(11%)	223(58%)	80(19%)	87(21%)	24(6%)
7	I'm satisfied with waste collection equipment used by the non-residents.	46(11%)	269(70%)	66(16%)	101(24%)	7(2%)
8	I'm satisfied with the cleanliness of the non-service area done by the non-residents.	55(13%)	248(65%)	63(15%)	74(18%)	19(6%)
9	I'm satisfied with the level of household participation in waste collection.	49(12%)	283(74%)	81(19%)	72(17%)	8(2%)
10	I'm satisfied with the level of reward provided by the household.	47(11%)	237(56%)	51(12%)	64(15%)	24(6%)
11	I'm satisfied with the rate of uncollected waste in my community.	7(2%)	14(3%)	44(10%)	219(52%)	139(33%)

Survey respondents reported high percentage were satisfied with the level of household participation in waste collection. Household involvement in solid waste collection is a necessity and thus, an issue of concern. Probable reasons for their participation in solid waste collection might be due to the absence of collection service by local authority, inadequate number of non-residents to cater for the service especially due to the periodicity of climate, where some of the non-residents returned to their villages to assist their parents in farming activities. Therefore, for these reasons, the residents has to participate in solid waste collection to keep a clean environment. This result is contrary to the findings of Wang *et al.* (2018) in China, according to this study lack of resident's participation is the major reason why formal collection could not reach other household. While in contrast with the studies by Mwanza and Anthony (2013) in Bulawayo, that one of the major causes of poor service in most cities is the absence of proper planning. Although, inefficient workforce, tools and poor access to certain areas is an issue.

Large percentage of the respondents were satisfied with equipment's used by the non-residents. The respondents could not provide the apparatus, but rather, the non-residents brought along with their waste collection tools to facilitate collection since payment for the service is expected. Babie *et al.* (2015) reported that the type of equipment may probably influence respondents' satisfaction with solid waste collection services.

Majority of the respondents were satisfied with the cleanliness of the non-service area done by the non-residents. This is in line with the studies by Dilsath and Prasada (2021); Addai and Abbeam (2014), according to this study, majority of the residents were satisfied with current solid waste collection services.

Survey respondents reported high percentage were satisfied with collection frequency. The proportion of frequency for waste collection is almost similar to other studies (Bees and Williams 2017) in England, this study found that (53%) of the respondents were satisfied with collection frequency. While Mwkatusiimeh *et al.* (2012) also found similar findings.

The non-residents satisfied large percentage of the respondents with collection service. The non-residents are in charge of waste collection in non-service areas, and therefore, contributed immensely towards waste management. This is similar to the studies by Sujauddin *et al.* (2006) in Chittango, Bangladesh, that 61.3% of the respondents were satisfied with the service provided TFKhanom *et al.* (2015); Mwkatusiimeh *et al.* (2012) reported similar findings. This result differed significantly with the studies by Almazan *et al.* (2019) in Liberia, there is no significant differences in the level of satisfaction regarding waste collection service among the households.

High percentage of the respondents were satisfied with the schedule time for waste collection in the non-service area. Paying attention to time is very important given the role that local community and the non-residents play regarding waste collection, and overall, waste management. This was consistent with the findings by Genatis *et al.* (2021) in Debie Berhan town, that most household were satisfied with the service. Calabro and Komilis (2019) reported that the level of service and quality depend on the organization.

Findings further revealed that a significant number of the respondents were satisfied with joint collection system in the non-service area. The possible reasons for this is that solid waste collection is a shared responsibility between both the respondents and the non-residents with a view to manage the waste. This result is consistent with the studies by Curran *et al.* (2007) in England, Almazan *et al.* (2019) Liberia, according to these studies, respondents were reported to be satisfied with collection services, however, access to waste collection service derives resident's satisfaction.

A small percentage of the respondents were very not satisfied with the level of household participation in waste collection. Respondents' involvement in solid waste collection became necessary, especially in a situation where a particular household is not serving with the non-residents due to the one problem or the other. Asteria and Haryanto (2021) argued that participation contribute to proper waste collection and overall waste management. Earlier study, Babayemi *et al.* (2017) reported that the main challenge for waste management in Nigeria is waste collection system.

Low percentage indicated very not satisfied with the waste collection service by the non-residents. We think that inefficient service delivery result to residents not to be satisfied with the service, poor service; low collection coverage and poor frequency among others, are the possible reasons for respondents not satisfied with collection services. This is in agreement with the studies by Albira *et al.* (2018) in Misrata city, that approximately 7.8% of the respondents reported not being satisfied with the service completely. In another studies (Kadafa *et al.* 2012; Seah and Fordwuor 2021) reported that solid waste collection is very unreliable, and in some areas, there is poor solid waste collection services.

Conclusion

The study used Quantitative method to investigate the resident satisfaction with the existing solid waste collection services. The findings revealed that majority of the respondents were satisfied with household participation in solid waste collection, and to some extents were satisfied with solid waste collection services provided. The results also indicated that high percentages of the respondents were satisfied with cleanliness of the non-service areas. Findings further showed that most of the respondents reported to be satisfied with collection frequency, the frequency for solid waste collection is attributed to the priority accorded by the residents. Although, the result demonstrated that weak percentages of the respondents were not satisfied with solid waste collection services, the poor satisfaction was because of the absence of waste management policies and legislations, accentuated by untrained waste workers. However, as indicated in the survey among the residents, the lack of efficient solid waste collection system is one of the utmost challenges; and how to manage the waste effectively remain a big issue for local authority. Although, non-service areas have taken preliminary actions to manage the waste using the non-residents to create a solid waste collection system. The study concluded that the existing solid waste collection system in the region showed a lot of room for improvement with a view to enhance the system, establishing efficient solid waste collection system should be a top priority for local authority, given the crucial role of the residents in solid waste management.

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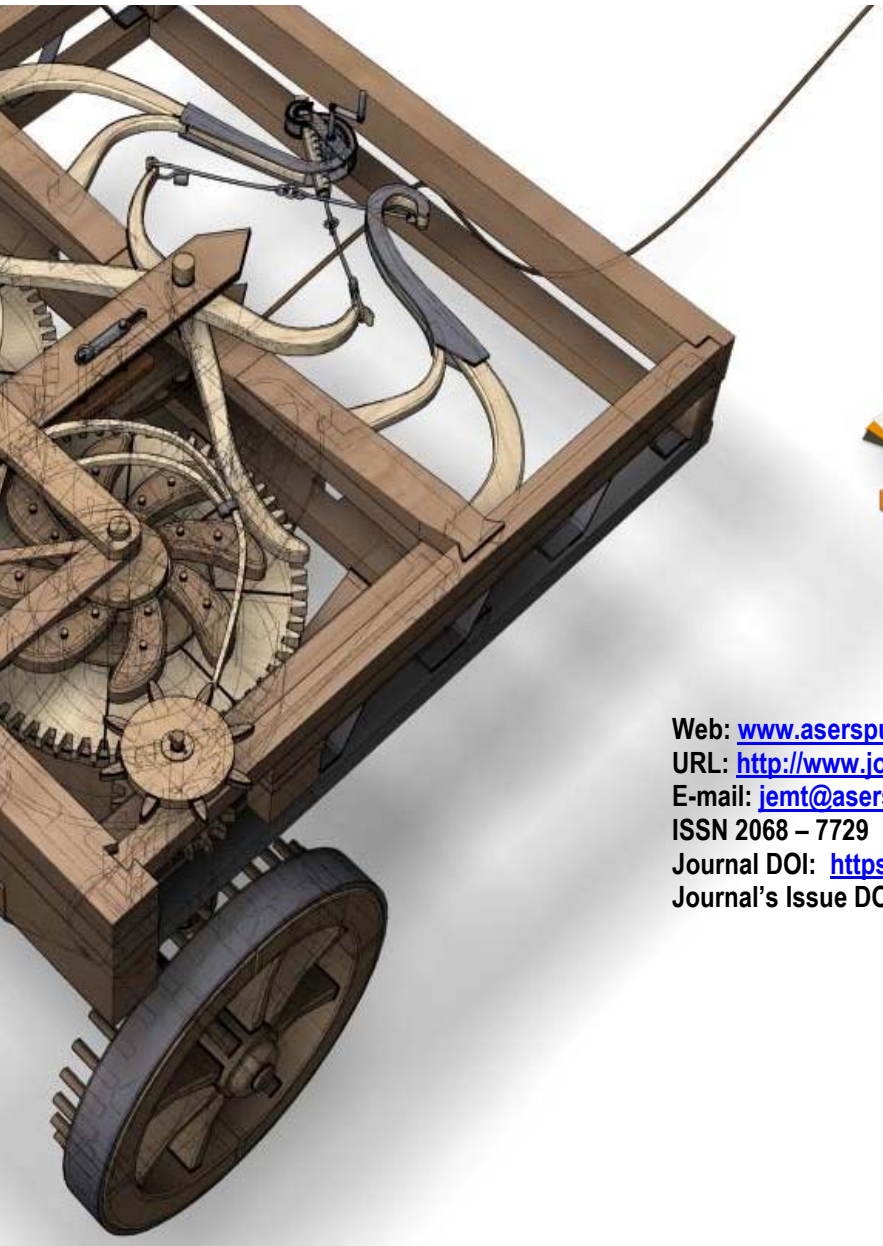

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