COMPLIANCE AND IMPLEMENTATION OF MUNICIPAL SOLID WASTE MANAGEMENT LAWS IN MUKONO MUNICIPALITY LOCATED IN WAKISO DISTRICT, UGANDA.

Abstract

Consumption and production of resources leads to generation of wastes that may be undesirable in the environment. Solid waste management laws are put in place aimed at ensuring proper and effective control and management of wastes in an area. This study was set out to assess the compliance and implementation of municipal solid waste management laws in Mukono municipality located in Wakiso district, Uganda. Specifically, the study sought to: characterize the solid wastes generated in Mukono municipality; determine the mechanisms of implementation of solid waste management laws in Mukono municipality; and to assess the effectiveness of the solid waste management laws in Mukono municipality. A case study design complimented with both quantitative and qualitative approaches were employed to obtain the required data to answer the stated objectives. A questionnaire and documentary review were used to collect the required data for the study. A number of solid wastes including food and food wastes; glass, plastics and metals; and textiles among others were generated in Mukono municipality. There are solid waste management laws used in the management of wastes in Mukono municipality. Some mechanisms including awareness creation, market-based approaches and monitoring implementation processes have been put in place for an effective implementation of municipal solid waste management laws. The study found out that there has been an ineffective implementation of municipal solid waste management laws in Mukono municipality which were most likely brought about by poor leadership, inappropriate allocation of funds and low levels of awareness among members of the local community. It is recommended that Environment Police should beef-up with other Institutions like the National Environment Management Authority for an effective implementation of solid waste management laws in the country. The government should enhance sensitization campaigns and enable appropriate allocation of funds for improvement of sanitation in the country.

Key words: Law Compliance and Implementation; Municipal Laws; Solid Wastes; Mukono; Uganda.

1. Introduction

Consumption and production of resources leads to generation of waste [1]. According to [2], waste is some material of marginal value to the generator which can be of value to another person. Municipal solid waste (MSW) are undesirable products mainly generated from the households, gardens, markets and restaurants among others [3]. Inadequate solid waste management may lead to the lowering in the quality of the environment [4]. It was reported that

the global annual MSW generation exceeded 1.3 billion metric tonnes and it has been estimated to rise to over 2 billion metric tonnes by 2025 [5]. In Uganda, the average MSW generation range per capita is 0.3-0.66 kg/day in urban centers and over 78% of the waste is organic [6]. Inappropriate sorting and collection, inadequate transportation means and treatment options and inappropriate disposal of MSW were identified as one of the major environmental concerns in Municipal Solid Waste Management (MSWM) in developing countries against the provisions of the available MSWM laws in force [7]. In developed countries about 70% on MSW is collected while sorted for treatment while in the developing countries, about 40% of MSW remains uncollected. Urban Authorities in developing countries are underfunded with competing service delivery priorities, disposing of MSW through open dumping, often resulting into air, land and water pollution, posing a great threat to public health and the environment [8]. Inadequately managed MSW serves as a breeding ground for disease vectors, contributes to global climate change through generation of greenhouse gases to the atmosphere, pollutes water sources, and soils [9].

Several laws have been enacted and regulations adopted at empowering cities and urban councils to manage MSW to ensuring a clean and health environment [10]. Poor solid waste management operations from the municipalities and cities are mainly attributed to the inappropriate implementation of the MSW management laws and inadequate funding amongst others [11,12]. The problem is most likely to grow even larger due to increasing population unless immediate steps for effective management of solid wastes are undertaken [6,7,13]. In Uganda, Urban authorities have been mandated to ensuring safe, reliable and cost-effective collection, transportation, treatment and disposal of MSW (The Local Government Act, 1997). The National Environment Act No. 5 of 2019 and the National Environment (Waste Management) regulation, statutory instrument No. 49/2020 further empowers Urban Councils to ensuring effective and efficient management of MSW using the best available techniques in their areas of jurisdiction. A number of interventions aimed at the management of MSW were undertaken in Uganda cities and urban councils, and twelve Municipal Solid Waste Composting (MSWC) plants were designed, constructed and their operations initiated to treatment wastes where Mukono municipal council was a beneficiary. In each city and Urban Council, one skip truck and twenty skip containers were allocated to help in the management of solid wastes [14]. Despite the enacted legislations that empowered urban authorities to manage MSW, the state of the environment, 2018/2019, revealed increased levels of indiscriminate dumping of municipal solid wastes in urban centres of Uganda including Mukono [15]. The current study was therefore set out to assess compliance and enforcement levels of municipal solid waste management laws in Mukono Municipality, Uganda. Specifically, the study objectives were to: 1. Characterize the solid wastes generated in Mukono municipality; 2. Determine the mechanisms of implementation of solid waste management laws in Mukono municipality; 3. Assess the effectiveness of the solid waste management laws in Mukono municipality, Uganda.

The study followed the normative theory of compliance to laws following the logic of appropriateness, viewing regulated entities as good faith actors that want to obey the law though they may not [16,17]. Normativity as spelt out by [16] is the phenomenon in human societies of designating some actions or outcomes as good or desirable or permissible and others as bad or undesirable or impermissible in relation to management of solid wastes. McKenna *et al.* [18] in their studies on the normative theory of compliance stressed the concepts of obligation, ought, duty, right and wrong to management of solid wastes. Normative theory holds that a person's moral actions are governed by a checklist of duties or rules that one is held to. In their work, [19]

restricts the use of the term normative to the evaluative sense and refer to the description of behavior and the outcomes as positive, descriptive, predictive and empirical. Therefore, normative theory aims to make moral judgements on events, focusing on preserving something deemed as morally good or prevent a change for the worse to the subject in question. Normative elements in a legislation describe the scope of the document setting out the provisions defined in Part 2 of the International Organization for Standardization Directives including requirements, recommendations and statements [20]. Statements include permissions, possibilities and capabilities necessary for the management of solid wastes [21]. Normative statements make claims about how institutions should or ought to be designed, how to value them, which things are good or bad, and which actions are right or wrong and they are usually contrasted with positive, that is, descriptive, explanatory or constructive claims when describing types of theories, beliefs, or propositions [22]. Normative theory posits that compliance may or may not occur largely because of the regulated entities' capacity in form of knowledge, regulations of the bye-laws and laws, financial and technological ability to comply and determined by norms and perceptions of the regulators and incentives to comply [23]. Accordingly, the theory calls for more cooperative approaches to ensuring compliance with the full range of compliance assistance and inspections designed to enable inspectors to provide compliance advice [16]. However, the complexity critique although more about bureaucratic and administrative limitation than about norms, focuses on the capacity of the regulated community, charging that environmental regulations are too numerous, too difficult to understand, too fluid or ever-changing and too hard to find. According to proponents of this critique most firms do not know what constitutes perfect compliance and so cannot achieve it. This would particularly be the case for small businesses, which generally lack the resources to stay appraised of complicated, changing regulatory requirements [24].

2. Methods

The study was carried out in Mukono municipality, Wakiso District, Uganda. A case study design was adopted to answer the research objectives. A case study is an in-depth investigation of an individual, institution or phenomenon [25], which places some more emphasis on the full analysis of a limited number of events and factors and their interrelations [26]. Ranjit [27] on the other hand, suggests that a case study design is an empirical inquiry which investigates a phenomenon within its real-life context, while Sekaran and Bougie [28] posit that case studies require quantitative evidence and relies on multiple sources of evidence and benefits from the prior development of theoretical propositions, which fits well with the current study that was conducted in Mukono municipality focusing on the implementation of solid waste management laws. The study was complemented with both quantitative and qualitative approaches since the nature of the data collected was both numerical and descriptive [29]. This triangulation approach was used because it covered a variety of data and revealed discrepancies which a single technique would not give, hence giving reliable information [30]. Qualitative design helped in giving detailed information while quantitative design involved the collection of numerical data that resulted into facts on the phenomenon [25,31].

The current study targeted a sample size of four hundred thirty-eight (438) respondents which was obtained from the total population of 38,759 individuals that resided in Mukono Municipality (Mukono Municipal Council, 2020). The sample size was determined using the Krejcie & Morgan table [32]. Among the 438 respondents that were approached for the study, only 428 respondents actively participated giving a response rate of 98%. The key informants

who were involved in the study included: Mukono Municipal Court Staff, Environment Police Force-Mukono Police Division, Civil Society Organization staff, Managers from selected industries, and some leaders from the selected market's location in Mukono Municipality. A simple random sample was conducted to select the study respondents whose views were taken as those of the entire population [25], while the key informants were purposively selected, a technique that permitted the selection of the respondents who were expected to have requisite information concerning the study variables [29].

The required data was collected using the questionnaire method from the respondents, key informant interviews from the key informants and documentary reviews using the questionnaires, interview guide and documentary check list respectively, as the tools. The questionnaire method involved the use of both closed and open-ended questions that probed the in-depth information about compliance and implementation of MSW laws in Mukono municipality [28,31]. The closed-ended questions were designed based on a five item Likert scale itemized rating of 1-5; Strongly disagree (1), Disagree (2), Undecided (3), Agree (4) and Strongly Agree (5) which were used to collect data from the respondents [33]. The use of the interview method was found to be flexible since it allowed both written and oral responses about the study subject [34,35]. Interviews also complimented quantitative data in generating more data that was relevant to the study variables [25]. The documentary review method allowed extraction of the secondary data from the progress reports, policies, and strategic plans aimed at answering some of the research questions [36]. Among the documents reviewed that had information related to the study included: National Environment Act, 2019; National Environment (Waste Management) regulations, S.I. No. 49/2020; and Mukono Municipality five-year development plan. The quantitative data from the questionnaires was cleaned, edited and coded to ensure consistence, accuracy and completeness of the questionnaire. The numeric data was computed using a software statistical package for social sciences (SPSS), version 20.0, to facilitate quick analysis of the data collected from correspondents based on the five-point Likert scale [37]. Quantitative data was summarized and analyzed using descriptive statistics such as frequency, percentage and mean scores for each objective of the study. The results were presented in tabular and graphical forms [38]. In addition, inferential statistics including were obtained. The correlations were used to measure relationships amongst compliance and implementation of the municipal SWM laws in Mukono as study variables. The qualitative data obtained from the interviews were transcribed and organized in words based on the study objectives. The non-numerical data was organized in a systematic way by establishing patterns, trends and developed themes on compliance and implementation levels of municipal solid waste management laws in Mukono Municipality. The qualitative data was used to come up with useful interpretations and conclusions. The researcher coded qualitative data using paragraphs and non-numeric data were cross checked and interpreted to identify contradictions.

3. Results and Discussion

3.1 Demographic characteristics of the study participants

The current study comprised of 428 respondents and some other key informants. The percentage number of the males and females were almost the same while about 88% of the respondents were aged 49 years and below. The majority (61%) had attained Ordinary level of education. The majority (71%) of the respondents had lived in the study area for 2 years and above (Table 1). Therefore, it could be assumed that the respondents had the capacity to read and interpret the

SWM laws and were aware of the implementation of the SWM laws in Mukono municipality, Wakiso District, Uganda.

Table 1: Demographic data of the respondents (Questionnaire survey, 2022)

Characteristics	Frequency (n=428)	Percentage (%)
Age of the respondents		
18-29 years	144	33.64
30-39 years	168	39.25
40-49 years	66	15.42
50+ years	50	11.68
Total	428	100.0
Gender of the respondents		
Male	215	50.23
Female	213	49.77
Total	428	100.0
Level of Education		
Master's Degree and above	6	01.40
Post graduate Diploma	6	01.40
Bachelor's Degree	30	07.00
Ordinal Diploma	125	29.20
Ordinary Level and below	261	61.00
Total	428	100.00
Duration of Service		
Less than 2 years	125	29.24
2-5 years	160	37.34
5-7 years	046	10.70
7-10 years	042	09.92
Above 10 years	055	12.80
Total	428	100.0

3.2 Solid wastes generated in Mukono Municipality

The municipal solid wastes were measured using six dimensions of wood, food, Textile, garden and yard, paper and pulp, glass, plastics and metals. The findings of the composition of the fresh municipal solid waste by percentage weight that were delivered in five skips at the municipal solid waste treatment plant mainly consisted of food waste (>79.7%) followed by glass, plastics and metal, about 9% as shown in Figure 1. Wood products constituted the least amount of the waste products (<0.4%). However, it was observed that the solid wastes generated and were ready to be disposed of were mixed and not sorted.

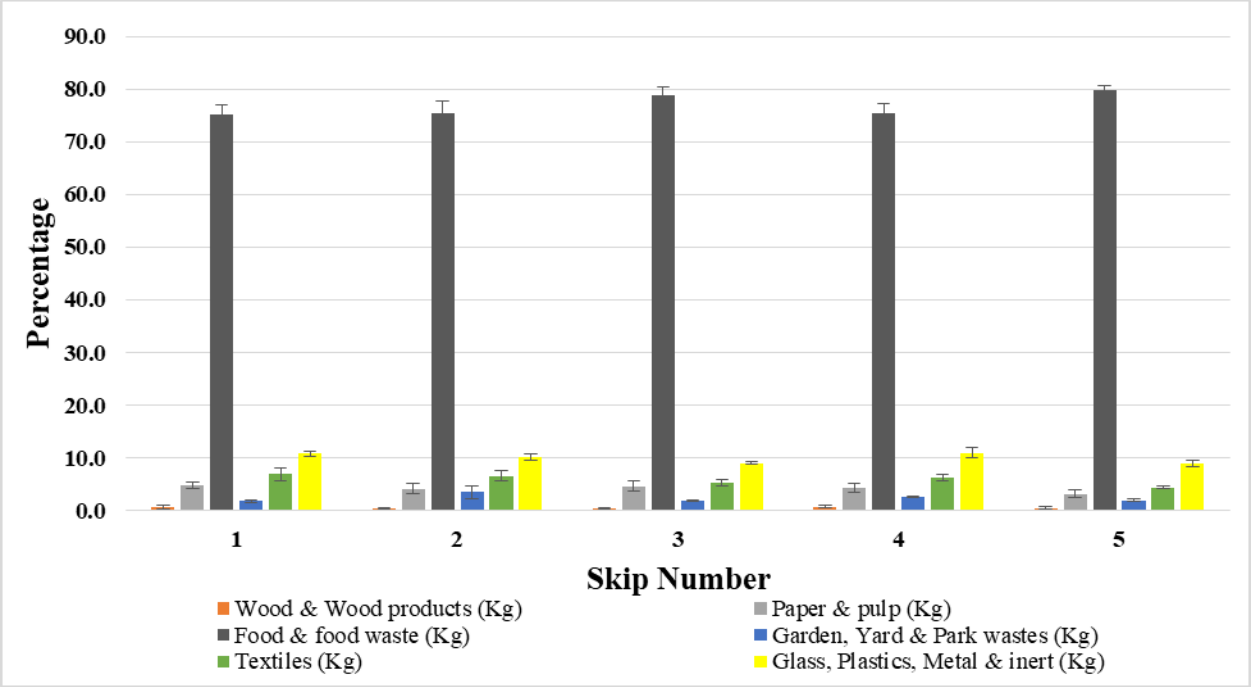

Figure 1: Constituents of solid wastes collected from Mukono Municipal Council (Primary data, 2022).

The findings were in agreement with [39] who stated that wastes generated especially by the individuals from low developed countries are always mixed up comprising of both biodegradable and non-biodegradable materials including wood, food, textiles and plastics among others. Annepu [24] posits that the composition of solid wastes produced from the developing countries vary depending on the consumption habits, income levels and standards of living of the people living in a particular area.

3.3 Mechanisms of implementing solid waste management laws in Mukono Municipality

Solid Waste Management Laws exist in Mukono Municipality and they include the National Environment (waste management) regulations S.I. 49/2020 which was reportedly being used by the Municipal authorities in managing solid wastes. The national laws which include the National Environment Act, No. 5 of 2019 and the Local Government Act were passed by the Parliament of Uganda and assented to, by the President of the Republic of Uganda, are among the other Laws used in the management of solid wastes in Mukono Municipality. In addition, the Mukono solid waste management by-law 2020, was approved by the Technical Planning Committee, the Executive and the Council of Mukono Municipality is pending approval of the Attorney General, to further be used in the management of solid wastes. Indeed, 81% of the respondents stated that Municipal Solid Waste Management Laws exist in Mukono Municipality, while 1% of the respondents reported that they were not sure of the existence of the Laws. This could have been attributed by the varying levels of education of the residents. The higher percentage that stated that the Laws existed could have been as a result of the respondents' able to read and follow the current affairs of the country, while the few who were illiterate and had not studied beyond the elementary level of education were not aware of the existence of the Laws that govern the management of the solid wastes.

Implementation of the Solid Waste Management Laws in Mukono municipality was ascertained using some statements as shown in Table 2.

Table 2: Mechanisms of implementation of the solid waste management laws in Mukono municipality (Questionnaire Survey, 2022)

Mechanisms of implementation of municipal solid waste management laws		SD	D	NS	A	SA	Mean	Variance	St.Dev.
Putting in place clear mechanisms supports the successful implementation of MSWM laws within the Municipality.	N	95	29	0	166	77	3.275	1.529	2.337
	Percent	26	8	0	45	21			
Implementation of MSWM laws is effectively done in this Municipality.	N	150	103	70	40	4	2.033	1.066	1.136
	Percent	41	28	19	11	1			
The level of awareness creation on MSWM laws is adequately done in the Municipality.	N	117	117	44	85	4	2.297	1.174	1.379
	Percent	32	32	12	23	1			
There are market-based approaches used to ensure effective implementation of MSWM laws.	N	26	40	44	48	209	4.019	1.329	1.767
	Percent	7	11	12	13	57			
Monitoring of implementation of MSWM laws is effectively done.	N	51	40	44	214	18	3.294	1.167	1.361
	Percent	14	11	12	58	5			

SD = Strongly Disagree; D = Disagree; NS = Not Sure; A = Agree; SA = Strongly Agree; St. Dev. = Standard Deviation; N = Frequency

Among the respondents, about two-thirds (66%) reported that there are clear mechanisms that support the successful implementation of the Municipal Solid Waste Management (MSWM) laws in Mukono. However, slightly above the two-thirds (69%) of the respondents reported that, despite of the mechanisms in place, the implementation of the Laws was not effectively done while the 19% of the respondents were not sure of the implementation. The results suggest that putting in place clear mechanisms are most likely able to support the implementation of the laws including municipal solid waste collection, transportation, treatment and their disposal. In addition, almost the two-thirds (64%) of the respondents agreed that awareness creation about municipal solid waste management laws among the respondents was not adequately done to promote MSWM laws. A Chi-square test was done to determine the relationship between awareness and implementation of the MSWM laws in Mukono municipality. It was realised that there was a strong relationship between awareness of the MSWM laws and their implementation in Mukono municipality (χ^2 cal. > χ^2 tab: *P=0.05*). The findings therefore suggest that awareness

creation on municipal solid waste management laws needs to be done for effective implementation of solid waste management laws in Mukono municipality. Market-based approaches as reported by about 70% of the respondents are likely to be instrumental in ensuring effective implementation of MSWM laws covering the solid wastes' collection, transportation, treatment, and their disposal. Additionally, about 63% of the respondents reported that close monitoring of the implementation of the MSWM laws would ensure their effectiveness which may result in timely municipal solid waste collection, transportation, treatment and disposal within the municipality. The findings are in agreement with some authors like [9] and [40] who stated that limited knowledge about solid waste management laws stifle their effective implementation. Barakagira and de Wit [41] and [42] indicates that, in order to overcome crises like solid wastes, members of the local community should be involved in the management of the environmental resources and their surroundings, together with promotion of environmental awareness, inculcating sustainable consumption and waste management practices. On monitoring, [15] stresses that, government authorities need to undertake environmental monitoring to ensure regulated and effective community implementation of environmental laws including MSWM laws.

3.4 Effectiveness of solid waste management laws in Mukono Municipality

Solid waste management laws exist and are being employed in Mukono municipality aimed at effective management of wastes. The study aimed at determining whether the laws that were being implemented were effective. Some statements as reflected in Table 3 were used to measure the variable.

Table 3: Effectiveness of the solid waste management laws in Mukono municipality (Questionnaire survey, 2022)

Effective implementation of municipal solid waste management laws		SD	D	NS	A	SA	Mean	Variance	St. Dev.
Timely Municipal Solid Waste collection is undertaken	N	59	227	15	51	15	2.281	1.024	1.049
	Percent	16	62	4	14	4			
Municipal solid waste transportation is appropriately undertaken.	N	110	73	52	88	44	2.681	1.422	2.021
	Percent	30	20	14	24	12			
Treatment of Municipal Solid Waste is optimally undertaken.	N	59	158	88	51	11	2.447	1.015	1.029
	Percent	16	43	24	14	3			
Municipal solid waste disposal is appropriately undertaken.	N	77	143	55	77	15	2.482	1.157	1.338
	Percent	21	39	15	21	4			
Law enforcement officers are	N	85	55	51	143	33	2.956	1.352	1.829

supported to execute their duties.	Percent	23	15	14	39	9			
The town looks cleaner due to implementation of municipal solid waste management laws.	N	29	26	41	176	95	3.768	1.1468	1.315
	Percent	8	7	11	48	26			

Slightly over three-quarters (78%) of the respondents stated that municipal solid wastes are not collected on time while a half (50%) of the respondents intimated that the municipal solid wastes are inappropriately transported. About equal number of the respondents, 61% and 60%, affirmed that municipal solid wastes are not well treated and disposed of respectively. All the enlisted ineffectiveness has been brought about by inadequate enforcement of the laws (50%) that govern the solid waste management in Mukono municipality. However, on the outlook, about three-quarters (74%) of the respondents reported that Mukono municipality is clean due to some law enforcement (50%) related to solid waste management in the area.

Effective implementation of the solid waste management laws in Mukono municipality have been brought about by poor leadership and hence low enforcement of laws as reported by 81% and 89% of the respondents respectively. In addition, inadequate funds (65%) and low technological tools (63%) that are supposed to be used during the management of solid wastes stifled effective implementation of solid waste management laws in Mukono municipality as shown in Table 4.

Table 4: Barriers towards effective implementation of solid waste management laws in Mukono municipality (Questionnaire Survey, 2022)

Barriers to implementation of municipal solid waste management laws.		SD	D	NS	A	SA	Mean	Variance	St. Dev.
The Municipality leadership supports the implementation of MSWM laws.	N	96	147	84	40	0	2.185	0.946	0.895
	Percent	26	40	23	11	0			
The Municipality allocates funds for the implementation of MSWM laws.	N	139	88	11	59	70	2.545	1.574	2.478
	Percent	38	24	3	16	19			
The Municipality ensures sensitization of locals about the MSWM laws.	N	146	77	1	117	26	2.455	1.453	2.112
	Percent	40	21	0	32	7			

The technological equipment are adequate to support SWM laws.	N	19	154	59	18	117	3.164	1.389	1.929
	Percent	5	42	16	5	32			

The findings are related with the information provided by some authors like [43] and [44] who revealed that effective leadership is a potential source of management that can lead to a sustained competitive advantage for organizational performance including implementation of solid waste management laws. On the contrary, [45] criticized leadership as one of the sources of poor implementation of laws especially when a superior-subordinate relationship exists among the stakeholders involved in an area. Sumukwo *et al.* [46] posit that in some developing countries, municipal budgets are directed to pay the over-staffed and, in some cases, under-qualified workforces, paying little attention to sanitation activities like management of solid wastes.

4. Conclusion

A host of solid wastes including food and food wastes; glass, plastics and metals; textiles; garden yard and park wastes among others have been generated in Mukono municipality. Solid waste management laws exist which are aimed at effective management of wastes in Uganda and Mukono municipality in particular. A few mechanisms including implementation ways, awareness creation, market-based approaches and monitoring the implementation process have been put in place for effective implementation of MSWM laws. However, implementation of the laws in the study area have been ineffective due to poor leadership, inappropriate allocation of funds, low levels of sensitization about the laws and inadequate technological equipment used for management of solid wastes.

5. Recommendations

- Based on the study findings and conclusions drawn, the Mukono municipal council and management should plan for periodic municipal solid waste composition analysis and material flow analysis aimed for proportionating different fractions of wastes since it was observed that no sorting of wastes was being done. The analysis would inform which categories and what amounts of wastes are generated for proper planning for management of wastes.
- There should be a promotion of market-based approaches which are likely to be instrumental towards effective implementation of MSWM laws other than only relying on waste collection, treatment and disposal that may in a long run be inadequate.
- Environment Police should beef-up the other institutions like NEMA officials that have been tasked for the law enforcement towards effective implementation of MSWM laws and other sanitation related laws in the country.
- There should be appropriate allocation of funds particularly those related to sanitation improvement for effective management of solid wastes.

- The government should enhance awareness and sensitization campaigns about the existence of the solid waste management laws to members of the local community which may tantamount to their effective implementation.

Data Availability

The data presented in the manuscript is available on request.

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