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Evaluation of Compliance of Urban Land Use Zones to Integrated Land Use Plan in Meru Municipality, Meru County, Kenya

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Abstract

Urbanization is supposed to follow a guided land use plan. However, in most of the towns in Kenya, Meru municipality included, this has not been the case. This can be linked to violation of land use plan regulations. This study evaluated the land use zones' compliance level with integrated land use plans in Meru municipality. The study sought to establish the level of compliance of various urban land use zones to the integrated Land use plan of Meru municipality. A sample of 389 residents from a population of 88,871 was selected using Krejcie & Morgan (1970) formulae. Questionnaires, interviews, remote sensing, and observations were used to collect data from developers and key informants. The study found that the average compliance levels of the five land zones were as follows: recreational/ Conservation zone (83.3%), commercial (75.8%), agricultural (52.8%), residential (50.1%), and compliance of industrial zone 44.8%. The study therefore recommended the following: land use plan implementation needs close monitoring; planning officials in Meru municipality need capacity building on evaluation and follow-up on land use plans.

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Abstrak

Urbanisasi seharusnya mengikuti padoman rencana penggunaan lahan. Namun, di sebagian besar kota di Kenya, termasuk Kotamadya Meru belum terjadi. Ini dapat dikaitkan dengan pelanggaran peraturan rencana penggunaan lahan. Studi ini mengevaluasi tingkat kepatuhan zona penggunaan lahan terhadap rencana penggunaan lahan terpadu di Kotamadya Meru. Studi ini berupaya untuk menetapkan tingkat kepatuhan berbagai zona penggunaan lahan perkotaan terhadap rencana penggunaan lahan terpadu Kotamadya Meru. Sampel 389 penduduk dari populasi 88.871 dipilih menggunakan rumus Krejcie & Morgan (1970). Kuesioner, wawancara, penginderaan jauh dan observasi digunakan untuk mengumpulkan data dari pengembang dan informan kunci. Studi ini menemukan bahwa tingkat kepatuhan rata-rata dari lima zona lahan adalah sebagai berikut: zona rekreasi/konservasi (83,3%), komersial (75,8%), pertanian (52,8%), perumahan (50,1%) dan kepatuhan zona industri adalah 44,8%. Oleh karena itu, studi ini merekomendasikan hal berikut: implementasi rencana penggunaan lahan perlu pemantauan ketat; pejabat perencanaan di Kotamadya Meru perlu meningkatkan kapasitas dalam mengevaluasi dan menindaklanjuti rencana penggunaan lahan.

INTRODUCTION

According to the National Development and Planning Commission of South Africa (NDPC) spatial planning is important because it gives direction and assessment of what is desired and all the possible spatial outcomes (Republic of South Africa, 1999). It ensures that limited resources are used for maximum social and economic benefits. It ensures further all spheres of government offer high quality services and also upholds the rights of the people through access to land and ensures the natural systems are protected.

Kitur (2019), noted that planning processes have mostly failed, with so many haphazard developments, poor housing and infrastructure, environmental pollution, and unimplemented laws and policies, among other difficulties. Devolution allows planning to play a bigger role in growth. Planning is prescribed as an important function in development planning by the Urban Areas and Cities Act, Kenya 2010 Constitution, and the County Governments Act (Republic of Kenya, 2012). The planned development role was not evaluated during the first cycle of devolution (African Planning Association, 2013) hence the need to evaluate the plans. There are three basic approaches to urban development planning used by Kitur (2019). The approaches include the following: Urban Development Plans (UDP), Zoning Integrated Plans (ZIP), and Local Physical Development Plans (LPDP).

Despite the enormous resources devoted to developing Urban Development Plans in the counties, most of them have remained unimplemented for long, according to the report. Officers in charge of planning and political leaders have little concern for it (Baker, 2014). This could be attributed to the fact that earlier planning practices had little impact on influencing a desired goal, because work activities that are considered concrete, such as infrastructure construction, are given precedence. It was also mentioned by Baker (2014) that county planning offices at the county level lack adequate resources both monetary and technical, for local plan effective implementation.

The population of Meru municipality has been growing steadily. In the year 2009, the population was 67,888 and was projected to grow to 81,852 by the year 2018. The projection for 2020 was 85,289 and 2022 projections stood at 88,871, according to the report of Kenya National Bureau of Statistics of 2009. This shows a general increase in population of around 30.9% from the year 2009 to the year 2022. According to the 2019 Kenya population and housing census, the population of Meru municipality stood at 80,191. This tremendous increase in population requires careful planning hence the need to evaluate whether the available land use plans conform to the land use activities on the ground (Republic of Kenya, 2019a, 2019b).

METHOD

The study was conducted in Meru Municipality, Meru County between longitudes 37.00º to 37.08º and latitudes 0.050º to 0.070º. The study used a descriptive research design. The objective of the study was to establish the level of compliance of various urban land use zones to the integrated Land use plan of Meru municipality. A sample of 389 residents from a population of 88,871 was selected using Krejcie & Morgan (1970) formulae in Meru Municipality. The study used questionnaires, interviews, remote sensing, and observations to collect data from developers and key informants. Data was analyzed using SPSS version 20. The reliability of the research instruments was enhanced through a pilot study that was conducted in the neighboring Isiolo Municipality.

Primary data was collected by structured questionnaires from respondents. Oral interviews were used to extract data from other respondents who needed assistance. Key informants' interviews were used to collect data from the physical planning offices of Meru County and the County Director of Nema, the town administrator, and public works offices. Observation was a key instrument to ascertain the data collected through questionnaires and interviews. Data was also collected through examining relevant documents and materials which might be difficult to obtain from the field such as land use planning regulations of Meru municipality and possible intervention measures for effective control strategies. Different checklists were used in different land use zones as stipulated in Meru County land use development regulations. Google Earth satellite images were obtained through remote sensing to show spatial-temporal land use land cover change between the year 2017 to 2020.

RESULT AND DISCUSSION

The study sought information on the level of compliance of urban land use zones to integrated land use plans in Meru Municipality. The compliance levels were sought in the commercial zone, industrial, recreation, residential, and agricultural zones.

Commercial Zone's Compliance

The study sought to find out the level of compliance with permitted land use, houses allowed, permitted plot ratio, and minimum plot sizes. The findings are presented in Table 1.

Table 1. Commercial Zone Land Use Regulations Compliance Levels

Land Use Regulations	Compliance (%)	Non-Compliance (%)
Permitted land use	79.7	20.3
Houses allowed	76.0	24.0
Permitted plot ratio	50.6	49.4
Minimum plot size	88.6	11.4

The study found that the minimum Plot size was the most compliant with 88.6% compliance with slightly less than half of the developers (49.4%) being non-compliant with to permitted plot ratio. Compliance with permitted land use and houses allowed were 79.7% and 76.0% respectively. A high level of minimum Plot size compliance was attributed to strict monitoring of the land ownership by the land boards. The low compliance in plot ratio may be attributed to a desire to maximize the plot which made the developers develop more than the recommendations on the land use plan.

The study found that 50.6% of the sampled developments were compliant with the four land use regulations that were evaluated representing a 100% level of compliance. A total of 13.9% of the sampled developments were compliant with the three parameters representing 75% level of compliance. A total of 5.0% of the sampled developments were found to be compliant with two land use plan (LUP) regulations representing a 50% level of compliance. The study found that 6.3% of the sampled developments were compliant with only one land use plan regulation evaluated; hence 25% level of compliance. It was noted that 24.2% of the sampled developments did not comply with any of the LUP regulations evaluated. The study concluded that the commercial zone had (50.6%+6.3%+5+13.9%) representing a 75.8% level of compliance, which was arrived at after summing up compliance of different Land use zone regulations at various levels.

The study found 24.2% non-compliance in a commercial zone which differs from Mugo et al. (2012) findings in her study on assessing non-compliance on physical plans in Olkalau town which found non-compliance in the commercial zone was 9.0%. This study attributed the high level of compliance to the strategic location of the zone within the central business district (C.B.D), which has enhanced the enforcement of the planning regulations.

Agricultural Zone's Compliance

The study sought information on agricultural zone compliance. The information obtained is presented in Table 2.

Table 2. Agricultural Zone's Compliance Levels

Land Use Regulations	Compliance (%)	Non-Compliance (%)
Permitted land use	59.8	40.2
Minimum plot size	70.3	29.7
Houses allowed	75.4	24.6

The study found that agricultural zone had 59.8 % compliance and 40.2 % non-compliance to permitted land use. Other land uses such as residential and commercial uses had invaded agricultural areas such as Nthimbiri and Munithu reducing the level of compliance in agricultural zones. This may be linked to the tarmacking of Meru-Mikinduri Road which had opened the area for commercial and residential land uses. Increased population in the municipality may also be attributed to agricultural zone non-compliance since developers in the other land use zones were developing agricultural zones due to the availability of space for expansion.

The rural houses allowed as stipulated by the plan were found to be the most compliant with 75.4% compliance while non-compliance was 24.6 %. The rural houses included timber and mud-built houses. The high compliance level may be attributed to the low population in the agricultural zone. This made the developers develop their land as per the laid down planning regulations since there was little competition for the land. In comparison to commercial zones, there were fewer economic benefits associated with agricultural zones hence developers were likely to comply with the planning regulations. Construction of the rural houses was easy to comply with since there was no specification on the homesteads especially when constructing semi-permanent houses. Non-compliance levels of 24.6 % may be attributed to the growth of the town especially commercial and residential areas making developers seek alternative developing areas in the agricultural zone where there is enough space. The study found the emergence of flats around the Munithu area which was supposed to be an agricultural zone. The flats were linked to the increased population within the municipality which made the developers invade other zones in an attempt to cater to the increased population.

It was noted that 70.3% of the sampled developers had complied with the minimum plot size of 0.2 Hectares (half an acre). The 70.3% percentage represents more than half of the sampled population being compliant with allowed minimum plot sizes. This may be linked to the low population in the agricultural zone. The non-compliance of 29.7% on the minimum plot size may be attributed to the rapid growth of the population in the other zones of the municipality. Developers tended to develop the agricultural zone where there was room for expansion. This resulted in the fragmentation of the available plots hence reduction in the minimum plot sizes.

In the agricultural zone, three parameters were evaluated that is; permitted land use, minimum plot sizes, and permitted houses. The study found that 35.6% of the sampled developments had complied with all three parameters being evaluated representing a 100% level of compliance. A total of 12.6% of the sampled developments had complied with only two parameters representing a 66.6 % level of compliance. Around 4.7% of the sampled developments were compliant with only one parameter representing a 33.3% level of compliance. The study noted that 47.1 % of the sampled developments did not comply with any of the land use plan regulations that were evaluated. The study therefore concluded that the level of compliance for the agricultural zone was 52.9% (35.6%+12.6%+4.7%). The level of compliance was arrived at by summing up all the compliance levels of respective land use regulations.

Industrial Zone's Compliance

The study sought information on three planning regulations namely permitted land use, houses allowed, and plot coverage. The information is presented in Table 3.

Table 3. Industrial Zone's Compliance Levels

Land Use Regulations	Compliance (%)	Non-Compliance (%)
Permitted land use	52.2	48.8
Houses allowed	49.3	50.7
Plot coverage	51.7	48.3

The study found that more than half of the sampled developers (52.2 %) were compliant with the permitted land use while 48.8% were non-compliant. The level of compliance and non-compliance was almost the same. The study observed a mix-up of land use in the industrial land use. A total of 24.1 % of residential houses were observed in the industrial zone, and 8.3% of public utility structures were observed which mostly included churches. The study also observed 10.1 % commercial land use in the industrial land use and lastly, 6.3% agricultural land farms were observed. The high levels of non-compliance may be attributed to the fact that construction of industries requires a huge amount of capital which may not be available to developers. Consequently, the developers resort to alternative land uses hence non-compliance.

More than half (51.7 %) of the sampled developments exceeded the recommended plot coverage of between 50-65% of the plot, while 48.3 % were compliant.30.3% non-compliance

to plot coverage was majorly witnessed in workshops since they have constructed many semi-permanent structures in the entire plot. The developers allow a large open area for their clients to approach them for repairs, therefore 20.4% of plot coverage compliance was observed in garages. The study observed churches in the industrial zone as shown in Figure 1.

Figure 1. Non-compliance in an Industrial Zone

The churches had been constructed to adjust to each other. The churches were supposed to be constructed in public utility zones yet they were in industrial zones leading to incompatibility of land use. The study identified ten churches' industrial zones. The developers said that they targeted the industrial zone where there was vast land lying idle. The number of industries was far less compared to the total land allocated for industries. The study found out that many developers could not raise the capital required for the development of industries hence hiring their land for other land uses such as the construction of churches.

The study found that 49.3% of the sampled developments were compliant with the permitted houses with 50.7% being non-compliant. There was a higher rate of non-compliance to houses allowed because of the mix-up of land use that was witnessed in the area. The study also noted that the high capital required to construct permitted houses such as factories, workshops, millers, and garages is unaffordable to many developers hence making them non-compliant. Shanty structures were also observed in the industrial land use zone.

The study found that 26.8% of the sampled developments had complied with both the permitted land uses and permitted houses representing 100% compliance. 18. 0% of the sampled developments were found to have complied with either one of the two land use regulations that were evaluated which represented a 50% level of compliance. It was found that 55.5% of the sampled development did not comply with either of the two parameters that were evaluated. This suggests that more than half of the sampled developments did not comply. This could be attributed to the high capital required to start industries. Developers opt to use the zone for alternative land uses. The study concluded that the industrial zone was 44.8 % compliant and 55.2% non-compliant with land use plan regulations. These study findings differ from Mugo et al. (2012) findings in her study in Olkalau town which found a high level of compliance of 79.56% in the industrial zone.

Residential Zone's Compliance

The study sought to find out the compliance of; plot ratio, permitted structures, permitted land use, and permitted plot sizes. The findings are presented in Table 4.

Table 4. Residential Zone's Compliance Levels

Land Use Regulations	Compliance (%)	Non-Compliance (%)
Permitted land use	47.3	52.7
Houses/ structures allowed	65.8	34.2
Minimum plot size	85.5	14.5

The information presented in Table 4 shows residential zone compliance based on the set land use regulations namely: permitted land use, houses/ Structures allowed, and minimum plot size. The study calculated the area occupied by structures and the total area of the plot. The ratio of the area of buildings to the total area of the plot then multiplied by 100% was calculated. The ratio of developments to plot area was then matched with the recommended plot ratios for the municipality. If the ratio falls within the recommended 25% for low density residential, it was compliant. If the ratio is within 50% for medium density residential it was considered compliant and if it falls within 300-350% for high density it was considered compliant. The findings of the study are presented in Table 4.

Slightly more than half of the sampled developers (52.7%) did not comply with the permitted land use. More than half of the sampled developers (65.8%) complied with houses allowed while less than a quarter of the developers (14.5%) did not comply with minimum plot sizes. The study found out minimum plot size regulation was the most compliant with (85.5%) level of compliance. Houses/ structures allowed were the second most compliant with (65.8%) level of compliance. Permitted land use regulations were the least compliant with (65.8%) level of compliance.

The high level of non-compliance to permitted land use was attributed to developers' desire to make money out of their plots which had made them convert them into commercial developments. The findings agree with Omollo (2018) findings that Kisii town's High level of compliance with permitted houses may be attributed to the fact that different classes of people are allowed to construct houses according to their ability. Therefore, developers develop houses according to where they reside and most of those houses are the once allowed, more than three quarters of the total population complied with minimum plot sizes. The study found that the allocation of land must be discussed by the land boards hence the minimum plot size must be adhered to. However, the small proportion of 14.5% which did not comply with the minimum plot size is said to have been allocated plots by the politicians a long time ago, but they lack the legal documents to support the plot ownership.

The Meru Municipality recommended plot ratio for low density is 25%. The study found that the compliance level was at 64.0 %. This may be attributed to high income levels for the developers and high literacy levels. The developments are found in the low residential zone of Kithoka and Milimani estates. The 36.0 % non-compliance may be attributed to the emergence of learning institutions such as Kemu and Meru National Polytechnic where developers developed flats and apartments to maximize the returns from their developments instead of bungalows and Mansions as outlined in the land use plan.

In the medium density residential zone, the recommended plot ratio is 50%. The study found that the plot ratio compliance level was at 21.0%. In comparison to low density residential zone, the compliance levels are relatively low. This may be attributed to population pressure in the town which has made the developers maximize their plot usage to increase their returns. Conversely, this has led to high non-compliance of 79.9%. The areas in this region include Runogone, Kemu, and Milimani areas.

The percentage recommended plot ratio for high density residential zone is between 300-350%. The study found that compliance was at 15.0 % while non-compliance was at 85.0%. The high levels of non-compliance especially in the Makutano area may be attributed to the many learning institutions found within the area such as Meru School, Kaaga Boys and Girls, Meru National Polytechnic, and Kenya Methodist University. This has led to increased

population pressure within the town. To provide the houses for both students and employees for those institutions, the plot ratio set has been violated. The built structures have covered a bigger area than the recommended area. This has resulted in congestion within the plots. The residents who own vehicles sought alternative parking areas, especially along the roads.

The study found that 65.8% of the developers were compliant with permitted houses within the residential zone. The houses allowed in low and medium density areas are maisonettes, bungalows, townhouses, hostels, flats, and apartments. The houses allowed for high density residential are flats, single rooms, and apartments. The study found that even though more than half of the sampled developments (65.8%) were compliant to allow houses 34.2% were non-compliant. Commercial and industrial structures were found within the residential zone. The study also found that 2% of flats that were supposed to be within medium and high residential zones were found in low residential zones.

The recommended minimum plot size for the residential zone is between 0.1 Ha to 0.2 Ha depending on the type of residential type; that is, high residential, medium residential, or low residential areas. The study found that 85.5% of the sampled developments were compliant with the minimum plot size. This may be attributed to the strict measures enforced by land boards when allocating the lands. The 14.5% non-compliant cited historical and political factors being behind non-compliance. Historical factors were cited by those who had already developed their parcels of land before the land use plan was rolled out, that is before the year 2013 (Republic of Kenya, 2013). All 14.5% said they were allocated the plots by prominent politicians within the county more than 30 years ago.

The study found that 21.7% of the sampled developments had complied with all 4 parameters that were evaluated representing a 100% level of compliance. Partly around 8.6% of the developers complied with three parameters representing a 75% level of compliance. Around 6.0% of the sampled developers complied with two parameters representing a 50% level of compliance. About 13.8% of the sampled developers were found to be compliant with only one land use regulation hence a 25% level of compliance. The study noted that 49.9% of the developers were not compliant with any of the parameters that is, permitted land use, plot ratio, permitted houses, or the permitted minimum plot size hence non-compliance. The study concluded that the compliance level for residential zones was 50.1% while non-compliance was 49.9%. This differs from what Mugo et al. (2012) found (0.716%).

Recreational/Conservation Zone's Compliance

The study identified six recreational/conservation areas namely: Mwendantu Forest, Kathita River, Kanyuru, Meru Forest, Nteere grounds, and open space near Gakoromone. The study found that out of the six recreation and conservations areas observed, five of them had complied with the intended land use representing 83.3% compliance with only one being non-compliant representing 16.7% non-compliance.

The study found that river Kathita had complied with the intended conservation land use. Nevertheless, the study found that there was dumping of waste products from the garages that have been located along the riparian land. In a stretch of approximately one kilometer, the study observed 19 garages that were dumping used engine oils and other waste materials. This has contaminated the water, especially for the residents in the lower course of the river. It was also observed that people were practicing agricultural activities along the riparian land. This resulted in a mix-up of activities hence resulting in non-compliance to land use.

The riparian land along river Kanyuru River had also been invaded by garages that were constructed along the stretch. The study found fourteen garages within a stretch of one km along the riparian land of the Kanyuru River. Garages along the R. Kanyuru were dumping their waste product within the river. The waste products included metallic wastes and used engine oils. All these dumped materials affected the conservation aspect of the river by making the residents not have access to clean water. The study also found five agricultural farms within a stretch of one km. Some of the crops found along the riparian land included: bananas, avocado trees, and nippier grass. Some of the crops were grown less than one meter from the river bank as opposed to the recommended riparian land of a minimum of 6m to a maximum of 30m on either side of the river bank by the Environmental

Management and Coordination Amendment Act of 2015. Similar findings on the invasion of riparian land by human activities were earlier observed by Omollo (2018).

The study revealed that the riparian land had been invaded by human activities. The study found that along the river riparian, the residents had converted it into a dumping site. The study also found that the riparian land had been converted into a farming area as shown by the growth of bananas. It also served as a parking ground. This posed the question of whether there was adequate parking within the municipality. It was found out that, most of the time during the day, the parking area got filled up. This made the drivers seek any packing space within the municipality opting to park along the riparian land.

The study also revealed that the residents practiced farming along the riparian land since there was no adequate land for urban farming. The agricultural zone had been invaded by other land use zones such as commercial zones. Furthermore, the study found out that the river Kathita had been converted to a dumping site since the municipality did not have enough dumping sites making the residents look for alternatives within and along the rivers. This ended up contaminating the water to the residents living on the lower course of the river.

The study further noted that human activities had invaded the Meru Forest which is in the conservation zone. Four residential structures were observed within an area that was previously occupied by Meru Forest. The study found that some of the flats under construction within the forest were labeled low residential zones in the 2017 land use plan. The study noted that the plan may have been altered to suit the new development within the conservation area since the structures were surrounded by Meru Forest, an indication that the conservation area may have been interfered with. Despite the interference with the conservation zone, a greater percentage of the forest was found to be compliant with the land use plan. This was attributed to strong enforcement by the forest guards within the forest. Non-compliance may be attributed to laxity by the political class who may have allowed the invasion of the forest.

The study found that the Mwendantu forest was compliant with recreation land use as stipulated by the land use plan. The high level of compliance may be attributed to strict enforcement by the forest guards who were found to be residing within the forest. The planning officials closely monitor the activities within the area, hence ensuring a high level of compliance. Despite the high level of compliance realized, the study also found that there was indiscriminate disposal of water plastic bottles, and soda bottles hence the need to control the menace.

The study observed non-compliance in the open space near Gakoromone. It was observed that the space did not serve the intended purpose of recreation since it had been used for alternative purposes of public and commercial purposes. It was noted that during the market days, the area is converted into a commercial zone, and traders display their stuff such as bananas and clothes for sale. The study also observed that on Sundays, some religious leaders invade the open space for their spiritual meetings. Around 81.3% of the traders interviewed within the area said that they were not aware of the open space since they had used it for commercial purposes for the last 10 years. The low levels of compliance may be attributed to the increased population in the town which had made the traders at Gakoromone market look for open space to do their trading activities.

The study found out that Nteere grounds which are designated for recreational purposes were compliant with to land use plan. A high level of compliance may be attributed to the strategic location of the recreational zone, which neighbors county government offices thereby allowing close monitoring of the area. The study also observed that the Meru County government had improved the landscape of the ground by ornamental plants which had improved the appearance of the ground. However, it was noted that the ground was littered with plastic bottles and snack leftovers. It was also found that the ground lacked proper fencing which made people access the ground from all directions. The study suggests that the county government needs to employ park attendants to closely monitor its operations.

CONCLUSION

The study sought information about the compliance of urban land use zones to the urban land plan on five land use zones in Meru Municipality namely: agricultural, commercial, residential, industrial, and conservation /recreational zones. The conservation zone was

the most compliant with 83.3%. The commercial zone was found second compliant with a 75.8% level of compliance with the industrial zone being the least compliant with 44.8%. Agricultural and residential zones had compliance levels of 52.8% and 50.1% respectively.

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