Influence of Application of Appropriate Technologies in Upgrading of Informal Settlements in Kigali

Enan Habiyambere, Stephen O. Diang'a, Githae Wanyona

Abstract*: *Informal settlement in the urban areas are a growing phenomenon. That are developed gradually where a big number of world's population live in them. The increase in number of the urban poor and rural migration looking for employments and urban services, natural population growth and lack of affordable serviced houses in the urban areas were found as the main cause of informal settlements. The low-income population has occupied unplanned and un-serviced public and private land through unauthorized and unregulated means, therefore the settlements were developed in areas where social services and infrastructures are lacking. The problem of informal settlements has been addressed through several methods according to the different informal settlement categories. Simultaneously targeting key regulatory issues to prevent the formation of new unplanned and underserviced settlements. Upgrading settlements through provision of basic social services and infrastructures is one of the intervention. This study was done on two settlements located in Nyarugenge District in the City of Kigali comprising Agatare and Tetero, their evolvement and development were identified and appropriate technologies that can be applied to upgrade them were recommended. Following the standards defined by Kigali city master plan adopted in 2013, upgrading of unplanned settlements have to increase densities and create affordable housing options for the most vulnerable to minimize relocation and displacement of poor populations, particularly of tenants. A way forward strategy was proposed, matching specific needs per settlement category. This includes improving key infrastructure to achieve positive socio-economic impacts and counter-balance socioterritorial segregation trends. This is supported by a legal framework for facilitating informal settlements upgrading, in line with the national strategy, aiming to lay the foundation for short and long-term upgrading and prevention interventions.

Index Terms*: *Upgrading Informal Settlement, Appropriate Technology.

I. INTRODUCTION

Poverty is a problem that developing countries did not be able to overcome. In the urban areas, poverty has led to the growing of informal settlements where low-income population live. The UN-Habitat (2015) estimate that over half of the urban population (61.7%) of the urban growth in African countries is informal [1].

In the past years, Kigali has undertaken major planning endeavor with the Conceptual Master Plan and the District development Plans, but the upgrading of informal settlements remains an unexplored field to control Urban Sprawl in mind to make the city for all people. The scarcity of the upgrading of informal settlements reflects, on the one hand, the dramatic past of the country and the recent urbanisation process, which has not found yet the way to embrace and express its own urban way of life. On the other hand, it reflects a lack of appropriate technics and resources invested at local, national and international level on addressing the issue of upgrading informal settlements.

Therefore, this research highlights the key challenges identified in our urbanization process, the existing condition that hinders the successful implementation of the City Master plan and possible solutions to addressing informal settlements with the objective to evaluate the influence of appropriate technologies in upgrading of informal settlements and examine the impact of adoption of alternative technologies with regard to the different informal settlement categories.

II. BACKGROUND

The increase demand for low cost houses has made informal settlements affordable areas for rental units in Kigali, the strict high planning and building regulations that are beyond the reach of low-income population resulted to search for housing outside the formal settlements [2]. In the summary of the informality, these informal settlements are characterized [3] by:

- Poverty;
- Lack of basic public services and infrastructures;
- Lack of formal land ownership and building permits;
- Poor housing;
- Risk of exposure to environmental hazards, building on marginal land and flood prone areas;
- A high density area.

Informal settlements were viewed by public authorities as undesirable settlements which led to eviction and demolition. The eviction as intervention was common in 1920s and 1950s backed by law [4]. But the upgrading was the best solution to the informal settlements and different interventions have been applied in different settlements.

In the upgrading of informal settlements, a set of interventions and strategic approaches have to respond to different informal settlement categories accordingly, including more suitable financing mechanism and regulatory frameworks.

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The different upgrading methods mentioned above, target these categories in different ways. Exploring the application of appropriate technologies/interventions on these different categories was of interest to this research. Understanding how they have been developed helped in determining future upgrading methods to prevent their proliferation and also improve the quality of life for the inhabitants.

Upgrading strategy was proposed, matching specific needs per settlement category. This includes improving key infrastructure to achieve positive socio-economic impacts and counter-balance socioterritorial segregation trends. The review of literatures has contributed to get more insights about Upgrading of Informal Settlements by using appropriate technologies.

III. LITERATURE REVIEW

A. Introduction

Human settlements are classified as rural or urban depending on the density of human-created structures and resident people in a particular area associated with their activities. The urban is an adjective referring to busy town life or living where heavily built-up areas, industrial and services-oriented activities take place while rural refers to life away from busy city life in, say, a countryside village and hamlets where dominated by agricultural related activities. The human activities classify these classes of human settlements.

The land within our cities and the policies that regulate it, shape the character of human settlements. Land is an important commodity in cities and its use is regulated through physical planning, which is the planning of land to be used in the near future by people to provide their needs [5].

The literature review was looking on the upgrading of Informal Settlements once they are accepted as human settlements that have to be in the cities. It was looking at what components in terms of planning, ownership, infrastructure and services have been availed and by whom through case studies.

B. Informal Settlements

Informal Settlements are defined as residential areas where inhabitants have no security of land ownership, neighborhoods usually lack of basic services and city infrastructure, and the housing may not comply with current planning and building regulations. It is often situated in geographical and environmental hazardous areas [6]. Baken classifies Informal Settlements as those settlements that [2]:

• Occur due to (un) authorized invasion and development of public and private land,

• Are through subdivision that are not registered officially or subdivisions that do not conform to planning regulations,

• Are within areas covered by customary tenure which have been made part of the city through cities expansion,

• Are built without permits from the local authorities. Defined as illegal residential areas.

The natural population growth, lack planned areas, high cost of land and shortage of affordable housing lead to unplanned densification and over utilization of available facilities and result to the informal settlements.

C. Planning in cities

Planning in cities is regulated through master plan in general and land use on the site level. Planning determines what should take place and where [4]. The formal city has a development guideline in terms of planning, service provision, building regulation and occupation [7]. However, implementation of plans has been a big challenge as seen through the phenomenon of informal settlement. The zoning limits activities where people tend to maximize the profit from land utilization to cover the land value that seem to be high in cities. The cost also limits the poor to access a land for shelter.

D. Ownership

Payne 2002 defines ownership as the mode by which land is held or owned, the set of relationships among people concerning land or its product [8]. For the urban poor the right to use land may be more important than the legal ownership, resulting in forceful occupation of unoccupied land, rental arrangements and buying through unapproved subdivisions [9].

E. Eviction

In the very beginning, government's reaction was to evict and destroy the settlements. Laws supported evictions. The dwellings being on private and public land and others on physically unsuitable areas helped to enforce the laws. Eviction however, has not succeeded as Informal Settlements have continued to increase in number and size from country to country and have ended up housing the majority of the urban dwellers.

F. Housing demand

The governments in some areas across the world started housing programs to replace the earlier programs of slum clearance. Mass housing on the other hand requires resources in terms of funds and skills. This is in short supply in developing countries and most of them are said not to have had housing policies, which contain clear and effective measures to deal with major housing constraints [4]. It is also noted that most governments cannot afford to house large number of the urban poor. Present level of public investment in housing is inadequate in relation to demand and private housing agencies are building very slowly [10]. In any case the programs by most governments targets the public employees and not the informal employed persons who cannot afford the rent.

G. Upgrading

According to World Bank (2016), upgrading is the improvement of the physical environment into the informal settlements [11]. This includes improving the infrastructure like water, drainage, sanitation, waste collection, roads, footpaths, lighting, public spaces among other things.

The Cities Alliance (2002) says that upgrading is improvement of physical, social economic organization and environmental undertaken locally to ensure improvements in quality of life for individuals [12].

H. Case examples of Upgrading:

1. Integrated Neighbourhood Upgrading Programme, Medellin, Colombia

When this programme was launched in 2004, it was estimated that the housing deficit in the northeast area of Medellin city was of 6,500 units. This 3-year pro-poor urban renewal programme was implemented at multiple scales by integrating both physical and social investments through a participatory process. It targeted the neighbourhoods of San Juan Bobo and Nuevo Sol de Oriente, and included different interventions

2. Favela Bairro Programme, Rio de Janeiro, Brazil

The Favela Bairro programme was implemented in Rio de Janeiro, Brazil, as a bold operation to upgrade informal settlements in situ. Previous interventions involved eviction and relocation of slum dwellers to the city outskirts, where land is cheaper. The programme pioneered land readjustment and regularisation activities, which in the past three decades were scaled-up to citywide strategies. In addition, a national legislation entitled the "Statute of Cities" (Estatuto das Cidades) was passed, regulating all public, private and community relationships in land management for the whole of Brazil.

3. Social housing in Los Piletones, Buenos Aires, Argentina

"Los Piletones" is an informal settlement located in the southern part of Buenos Aires, which represented an innovative approach for urban upgrading and housing provision in poor urban areas in Argentina. One of the principles of this approach is to provide social housing to vulnerable families living in poor building structures or located in flood prone areas. The city government, with the support of central authorities, subsidises the development of social housing in empty areas close to the targeted informal settlements. In parallel, road construction works are carried out to improve accessibility in these settlements, thus re-organising their spatial settings and allowing for the provision of social services and amenities (e.g. improved and equipped public spaces, etc.).

4. Social housing for poor migrants, Quinta Monroy, Chile

The provision of affordable housing with reasonable plot sizes for large migrant families is a complex issue to be addressed. This project was implemented in a region of Chile where poor migrants are attracted by the mining industry, generally ending up in slum areas.

The project was conceived by Alejandro Aravena, a Chilean architect, who has recently won the prestigious international architecture Pritzker Prize for it, to prevent slum formation and provide dignified housing conditions to the migrants.

I. Overview on appropriate technologies in upgrading

Available literature is very rich on informal settlement upgrading projects. The most interesting aspect about upgrading is the knowledge that it has evolved out of recognition of the poor's own capacity to house themselves against all odds. It also narrows down to authorities accepting that they are incapable of housing the large population in the cities with limited resources available at their disposal. This has tried to trace the development of Informal Settlements from a historical point to the current debate of upgrading.

Though upgrading is a methodology derived from peoples' capacity of improving own shelter and settlements this chapter has traced several actors. The actors differ depending on the upgrading technology introduced in a project. [7] puts the difference between the formal city and the informal on the development process. The formal starts with planning, servicing building and occupation with a guaranteed legal land ownership. The informal starts with occupation, building, servicing and then planning with no legal land ownership guaranteed. Upgrading technologies are addressed in the form of physical planning, servicing and ownership that lack in the informal settlements.

J. Planning technology

From the cases given in this chapter, it can be concluded that upgrading technology depend on the actors playing the major role in projects. The only common technology is the physical planning. However, the extent of planning is also dependent on actors. Where NGOs and local community are the main actors, planning technology is limited to people's identification of their immediate needs and their capacity to meet the needs. When donors and governments are involved, physical site planning is at a higher level with master plans and standards of some kind.

K. Ownership security

Provision of legal ownership in upgrading projects stems from believing that poverty and housing condition can be addressed through legal ownership of property. It is supported by the World Bank [11] and by respective governments whose excuse of not giving services to informal settlers is based on their illegal occupation of land. Almost all projects funded by the World Bank, therefore have a tenure component.

L. Basic Social Services and Infrastructure

Following the upgrading projects, the main concern raised is to avail basic services. It was identified that the NGOs projects and community based self-help are mostly targeting the provision of potable water together with basic health facilities. Further concerns are the provision of infrastructure and basic services including roads, drainage, electricity, schools and medical facilities among others.

M. Background of Informal Settlements in Rwanda

Rapid urbanization: Rwanda is among the fastest-growing economies that have recorded sustained and widespread economic growth on the African Continent [13]. With agriculture accounting for a third of its economy. Urbanization, if not looking at only consumption, but commercial and industrial productivity, domestic growth through massive job creation and protection of natural and agricultural resources, offers opportunities for a sustained and intensified growth and subsequently an improved livelihood to the growing population.

Rise of informal settlements: Rwanda has an agriculturally based economy, the exploits from agriculture have not been extensive for much of it is subsistence farming. Besides, this kind of farming is weather dependent hence the nature of poverty in the rural areas. The little manufacturing and service economy is dominantly in the cities. Poverty in rural areas and employment opportunities in urban centres have led over the years to rural-urban migration. This has led to demand for housing into informal settlements.

IV. RESEARCH METHODOLOGY

The methodology used to collect data for this research included interviews to community representatives and questionnaires were the main tool to undertake the data collection process where spatial organization of the settlements were analyzed from aerial images and maps.

Respondents classified according to their status as landowners or tenants to help collecting and producing data that supported the development of concrete proposals. To complements to the findings, the data were collected also from Government officials and utility providers.

This research focuses on illustrating different proposals, possible approaches and specific intervention strategies for upgrading and preventing informal settlements in the City of Kigali, which were designed according to the characteristics of the different categories of informal settlements by taking into account the peculiar geographical, infrastructural and socioeconomic conditions of each category of settlements, and their potential impact. For this category, two informal settlements located in Nyarugenge District in the City of Kigali comprising Agatare and Tetero were analyzed to give data for the analysis of evolvement and continuous developments and the proposed interventions.

The sample size was estimated based on a proportion where it was calculated with an approximate 95% confidence level, the following formula was used:

$$n_0 = \frac{z^2 pq}{e^2}$$ [14]

Hence $n_0 = \frac{1.96^2\, 0.5(1-0.5)}{0.1^2} = 96$

Which is valid where n0 is the sample size, Z2 is the abscissa of the normal curve that cuts off an area α at the tails (1 - α equals the desired confidence level, e.g., 95%), e is the desired level of precision, p is the estimated proportion of an attribute that is present in the population, and q is 1-p. The value for Z is found in statistical tables which contain the area under the normal curve. Finite population correction for proportions:

$$n = \frac{n_0}{1+(n_0-1)/N}$$ [14]

Total compliant households N= Agatare Cell (1,306)+ Tetero Cell (1,077)=2,383 [15]

Sampling size: $n = \frac{96}{1+(96-1)/2383} = 92$

Where n is the sample size and N is the population size in all Cells. Taking na and nt, the sample size of Agatare and Tetero Cells respectively; the percentages of each Cell is calculated based on the total number of household:

Households interviewed in Agatare Cell: na=n*E= 92*(1306/2383) =50

Households interviewed in Tetero Cell: nt=n*E= 92*(1077/2383) =42

The data in each selected settlement were collected to formulate the influence of application of appropriate technologies in upgrading informal settlements in the City of Kigali in a participatory and evidence-based manner.

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The selected areas that were surveyed are representative of the different categories of informal settlements and this help in designing future upgrading interventions. The survey strategy involved the initial identification of local leaders who can provide general information about the study area and select landowners and tenants to be interviewed and complete the questionnaire. As some of the questions related to land ownership and the contractual relation between landowners and tenants are extremely sensitive, they were handled carefully. The numbers of interviews that were carried out do not seek statistical significance, but rather to understand the priorities and preferences of landowners and tenants.

The specific and tailor made interventions and Influence of Application of Appropriate Technologies in Upgrading Informal Settlements were presented.

V. RESEARCH RESULTS AND FINDINGS

Informal Settlements have grown side by side with the formal settlements. In time, due to the shortage of affordable housing from the formal sector and lack of planned land in the market, the two settlements (Agatare and Tetero) were developed incrementally and become the affordable housing areas for people seeking employments and services into the city center. The settlements accommodate people with different income earners. People have right to land by owning land documents and this brought a sense of ownership security that has led confidence to gradual incremental development where public utilities have continued to tap the clientele. The two settlements show inadequate availability and development of the basic services (infrastructures, public facilities etc…). The uncontrolled developments with unappropriated technologies used is the most insecure in the settlements.

Although the two settlements are mainly comprised of poorly accessible houses in deteriorating condition (largely of adobe blocks and wood with iron sheet roofs), there are pockets of residential development and civic buildings (churches, clinics and schools) that consist of entirely new structures or ones that have undergone significant renovation. In the last few years, there have also been targeted investments made in public amenities, such as a covered walkway/drainage channels and some tarmac roads. Despite these localized improvements, the settlements are is still characterized by a lack of infrastructure/public services and few organized site systems such as pedestrian, drainage and slope management. These infrastructural challenges shown a need for a quick interventions. Although the Kigali City Master Plan does propose the introduction of a few collector roads intended to improve overall access to and within the surrounding context of the settlements the current situation is critical.

As with the discrete building improvements or new construction projects, there have been successful attempts to strengthen the social networks as well. Residents have organized themselves into cooperatives (e.g., weaving, wetland agriculture, transport) in order to promote economic opportunity in Agatare settlement, gender equity and community engagement. District authorities have also stepped in to assist the community in developing processes to facilitate participation in the collection of fees for transportation improvements and waste management.

the appropriate technologies recognizes and calls for the need to ensure socially equitable development and environmental integrity in all urban infrastructure developments with guiding principles of designs which encourage densification of the city, resulting in reduced urban infrastructure and services costs, as well using social inclusive growth. Where these were compromised in the development of the Agatare and Tetero settlements, it has identified in the survey that shows that only 36.8% of the respondents in Agatare and 30.5% in Tetero built their houses with a hired skilled labour,

Agatare Cell is an informal area in need of infrastructure development (especially roads) and improved access to basic services. From the interviews carried out in Agatare, the understanding is that although upgrading efforts are generally welcome, the approach of constructing new roads and bring up all new infrastructures is expensive due to the high costs involved for compensating land owners affected. And this can seriously affect donors or other institutions that need to help in upgrading.

This confirms the extreme difficulty to sustainably replicate this approach in other informal settlements. In addition to the high cost of the intervention, there is also the threat of gentrification. In fact, investments in centrally located areas leading to physical improvements in infrastructure and in the overall neighbourhood quality tend to encourage land owners to charge higher rents. This eventually pushes out or directly affects the sitting tenants, especially if they do not have the financial means to pay for a higher rent. This was clearly expressed by the tenants during the interviews, as they perceived the upgrading process as a threat to their ability to remain in the area. To generate a real change at the city scale, a different set of pro-poor policies, legal framework, financing systems and approaches need to be put into place.

Tetero is an area strategically located, close to a public transport hub with buses connecting to most cities and towns of Rwanda. Hence, the commercial profile of these areas is very attractive for business development, especially for low-income groups seeking to open small shops as income generation opportunities.

This informal settlement is located along a downhill slope, with clear signs of urban degradation despite their economic vibrancy. The proposed major interventions are the following:

I. Urban expansion projects: there is a need to reserve an area of these settlements, preferably close to major infrastructure, for development. Such urban expansion projects will require the demolition of existing structures that will be replaced by high density multi-storey buildings, mainly for residential purposes. The ground floors of these buildings will be used for commercial activities, which will benefit from pedestrian and vehicle traffic thanks to improved road and transport services.

II. Clustering and densification: these areas would need to be subdivided into cluster of houses to facilitate urban renewal operations. This would encourage land owners to build affordable multistorey housing (e.g. condominiums) through public-private partnerships (PPP) to achieve higher densities.

III. Improving urban basic services provision: the subdivision of these areas, by opening internal roads and creating the above-referred clusters of houses, will favour the provision of basic urban services such as water, sanitation and electricity.

IV. Public space and green areas: finally, the creation of public spaces and urban gardens in environmentally fragile areas, such as wetlands and dumping sites, should be encouraged to improve the living conditions in these informal settlements. Where suitable, these public spaces can be used for installing social services, such as schools and health centres, according to the population needs and priorities.

These proposed interventions fulfil the Kigali master plan's standards which require a general increase of land occupation density.

For their effective implementation, the following main activities should be carried out:

- negotiations with land owners to carry out land pooling/readjustment operations and creating more space for infrastructure development, urban expansion projects, public spaces, etc.;

- establishment of public-private partnership between land owners, transport companies and the CoK for implementing the urban expansion/renewal projects, especially to develop infrastructure and construct affordable multi-storey buildings in the form of rental apartments targeting low and middle-income tenants.

Further on, the analysis carried out on the Kigali city master plan shows that both sides of the highway are available for public space/infrastructure development. In this case, it is proposed to establish green corridors at the citywide scale, based on topographic restrictions.

This supports the principle of moving towards a radial city structure, in which the upgrading and renewal of unplanned and underserviced settlements is critical to make efficient use of available land for densification and development of affordable housing units.

In this regard, reference is made to best practices implemented in the city of Medellin, Colombia, which provide concrete examples on how the above-proposed types of interventions can be successfully carried out, achieving positive socio-economic outcomes for city dwellers.

VI. CONCLUSION

From the research finding, land ownership security was not seen as a problem in the settlements of study. What came out was the need to have adequate infrastructures and basic services and effective refurbishment of the houses.

For preventing and upgrading informal settlements, it is crucial to understand the cause of the informal settlements and the preventions. According to the characteristics of each identified category of settlements, The proposed interventions to address the causes for the formation of informal settlements are presented (Source: Own field survey):

Causes of informal settlements	Proposed strategies
1. Expansion of rental housing market density)	I. Increase the supply of rental housing (higher)
2. Speculative land markets	II. Encourage land banking (public/private)
3. Infrastructure shortage	III. Supply of key missing infrastructure to ensure full connectivity
4.Unaffordable housing	IV.Increase cooperative housing and upgrade the existing stock
5. Lack of social cohesion	V.Encourage ommunity associations
6. Low density sprawl, creating ne	VI. Harmonise the master plan and settlement standards

For upgrading informal settlement, a central role is to be played by City and Districts in association with MININFRA and RHA. A special purpose public corporation could be established, which will be responsible for regulating and coordinating the different activities. In particular, this public corporation should engage with different stakeholders (Tenant housing associations, Land owner associations, Neighbourhood/community associations, Public and private enterprises, Private Real Estate Developers, etc). Different informal settlements categories and proposed interventions are presented table below (Source: Own field survey).

Informal settlement category	Land-related interventions	Main infrastructure interventions	Housing interventions
1. Central overcrowded areas	Opening roads & land readjustment	Water & sanitation	Upgrading & building new units
2. Uphill sloped settlements	Sidewalks & land readjustment	Retaining walls, terracing and drainage	Upgrading/renovation
3. Downhill sloped areas	Sidewalks, roads & land readjustment	Water and sanitation	Upgrading/renovation, demolition
4. Inaccessible areas	Expropriation, roads & land readjustment	Drainage and bridges	Renovation
5. Small-pocket settlements	Relocation	Sanitation	Renovation
6. Peri-urban areas	Land leasing for agriculture	transport	upgrading

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REFERENCES

1. UN-HABITAT, 2015. 22 – IFORMAL SETTLEMENTS, NEW YORK : HABITAT III ISSUE PAPERS.
2. BAKEN, R. J., NIENTIED, P., PETTERNBURG, M. & ZAAIJIER, M., 1991. NEIGHBORHOOD CONSOLIDATION AND DEVELOPMENT OF THE INFORMAL SETTLEMENTS, S.L.: S.N.
3. MACAUSLAN, P., 1985. URBAN LAND AND SHELTER FOR THE POOR. LONDON: EARTHSCAN.
4. PAYNE, G., 1984. LOW-INCOME HOUSING IN THE DEVELOPING WORLD: THE ROLE OF SITES AND SERVICES AND SETTLEMENT UPGRADING. NEW YORK: JOHN WILLY & SONS.
5. LIER, V. ET AL., 1994. SUSTAINABLE LAND USE. AMSTERDAM: ELSEVEIR.
6. UN-HABITAT, 2016. INFORMAL SETTLEMENTS , S.L.: UN-HABITAT III.
7. BAROSS, P. A. L. J., 1990. THE TRANSFORMATION OF LAND SUPPLY SYSTEMS IN THIRD WORLD. S.L.:S.N.
8. PAYNE, G., 2002. LAND, RIGHTS AND INNOVATION: IMPROVING TENURE SECURITY FOR THE URBAN POOR. LONDON: ITDG PUBLISHING.
9. DALE, P.F., MCLAUGHLIN & J.D., 2000. LAND ADMINISTRATION. S.L.:OXFORD UNIVERSITY PRESS.
10. ASIAMA, S.O. & ACQUAYE, E., 1986. LAND POLICIES FOR DEVELOPMENT FOR LOW-INCOME GROUPS IN AFRICA. S.L.:S.N.
11. WORLD BANK, 2016. INFORMAL SETTLEMENTS. NEW YORK: S.N.
12. CITY ALLIANCE, 2002. SUSTAINABLE DEVELOPMENT..
13. PETERSON, T., 2010. RWANDA ONE OF THE FASTEST GROWING ECONOMIES. THE NEWTIMES.
14. ISRAEL, G. D., 1992. DETERMINING SAMPLE SIZE, FLORIDA: UNIVERSTY OF FLORIDA.
15. DISTRICT, N., 2018. STATISTICS, S.L.: S.N.

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