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The Transforming of Traditional Indian Villages into "Smart Villages": Its Impact and Challenges in India

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ABSTRACT

The article's primary goal is to introduce the idea of a "smart village" as a tool for carrying out public duties in rural regions. The notion of the smart village is founded on its theoretical foundations. Each village possesses a wealth of human resources that, when utilized well, can yield significant advantages. The usage of smart technology in these smart communities is absolutely necessary. Designing and creating smart villages in India could be done using a framework that includes a number of variables, including social, legal, governance, and technology aspects as well as associated metrics. One of the key focal areas of a smart village ecosystem is the efficient use of energy. It takes new finance models and a supporting contemporary ecosystem to develop new technologies that the general public can use. The development of an ecosystem for these smart communities should prioritize both the financial potential and the location. In a smart village, solutions specific to the local economic, social, cultural, and environmental conditions would be put into practice.

KEYWORDS: Governance, Smart villages, Social, Legal, and Technology

Introduction

The term "smart" was first used in Europe in 2010 to refer to an inclusive economy and smart growth. Because of the technological advancements of today, everyone has adopted clever development strategies. Utilize technology and clever methods to make people's lives easier and more sustainable, according to every industry. Thanks to its creative concepts, technology is ruling the twenty-first century. Overuse of natural resources, greenhouse gas emissions, the burning of fossil fuels, deforestation, and the encroachment of new projects into some lakes and ponds.

The world is currently experiencing the effects of excessive use of natural resources, such as climate change, as a result of our treatment of the environment. In addition to the usual floods, earthquakes, and cyclones that occur all over the world, countries are also dealing with famine and protracted droughts. Currently, in order to address this and with increasing technological advancements. Developed countries have started with the concept of smart development which make the use of nature and technology to attain sustainable in the world, where instead of natural resources we are much more depend on artificial intelligence, machine learning, Information and technology to live a better living which is eco-friendly and doesn't affect the environment for instance digitalization of economy, promotion of digital education which has reduced the use of paper, in most of the foreign countries everything from assignment to class

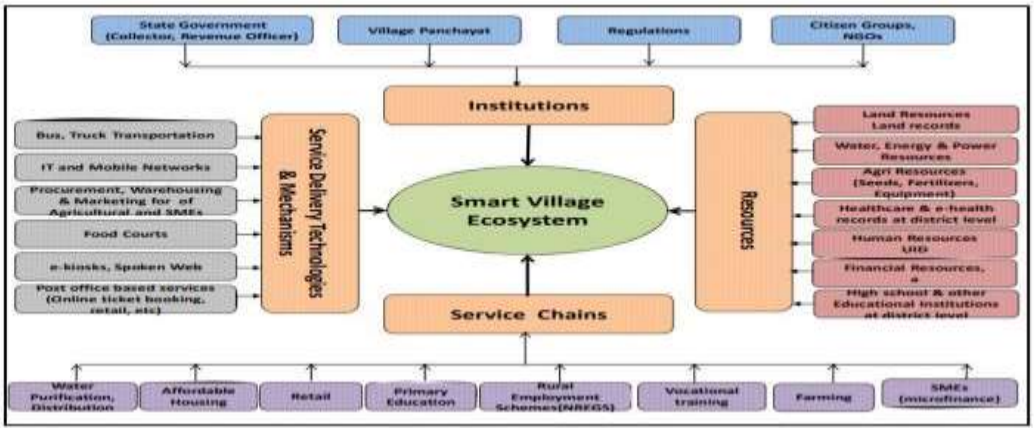
lecture happens using a digital platform, we have smart class rooms, Wi-Fi in all the schools and universities which has indirectly saved many trees from cutting down and also helped in the reducing the carbon footprint with a rise in digital economy which can also be defined as a smart economy. Agriculture has adopted smart farming and the use of technology for high productivity, vertical farming requires the use of LED lights and artificial intelligences. we have solar panels and solar roofs in almost all buildings, Singapore and South Korea have developed green building which provides oxygen all time and absorb carbon dioxide in the urban area, instead of planting trees in particular regions, a smart way for reducing carbon emission effects in the atmosphere and bringing back the ecosystem and biodiversity to their homes. We have electric cars and eco-friendly transport, we have introduced smart bicycle which provides luxury and smart travelling with unique features and we have special road construction for walking and bicycling which also provides health benefits. With the development of 100 satellite towns, India's Smart City Mission is also aiming for smart living.

Now the focus has been on developing smart rural villages, for bringing a standard of living for the people, with modernization and technology dominating the world, why should some areas be denied access to the advantages of smart living, which can improve their quality of life? A "smart village" is one where local communities benefit from the integration of information technology systems, innovation, and the efforts of institutions and residents.

People who lived in rural areas remote from development centres made up the majority of them. The network that offers access to the most recent advancements in biotechnology, finance, mobile healthcare technology, and information and communication technology (ICT) does not reach them. The "smart village," according to the original strategy, is an example of how development is accelerated by energy availability. Technological reform that was successfully implemented was supposed to help the economy, health care, and education. Rural residents could enjoy multiple aspects of “urban life” while preserving the valuable aspects of rural life and ensuring national sustainability.

The concept of a smart village is a constructive response to a set of interrelated phenomena and processes, which has become more frequently perceived in the EU, which has been called a vicious circle of decline (Figure 1). The conducted literature survey concludes that the idea of the smart village is most often associated with objectives such as improvements in welfare, energy savings, a low-emission economy, a reduction in inequalities between urban and rural areas, and an improvement in economic conditions. There is also an emphasis on improving governance efficiency, improving rural livelihoods and human resources, and issues such as improving disaster resilience and reducing energy poverty.

Figure 1: Smart Village Ecosystem



The concept of smart villages, utilizing intelligent solutions, aims to decrease service costs while maintaining the quality of service for residents and enhancing their quality of life. Currently, the most significant opportunity for decreasing these expenses is found in solutions that lower energy usage. A smart city aims to execute public functions through the utilization of IT solutions while engaging various groups of stakeholders. By incorporating a variety of entities into the city formation process, the idea of more inclusive development for a specific territory is realized. This, in turn, is expected to result in the creation of a city that aligns with the aspirations and visions of its inhabitants and creators. The solutions used in the smart city formula can be successfully applied in the creation of a smart village, taking into account the unique ways that rural communities operate.

Literature review of Smart Village

Despite being a relatively new idea in EU policymaking, the Smart Village initiative brought together over 340 rural stakeholders in Ireland in 2016 to try to develop an EU vision for "A Better Life in Rural Areas" with strategies that outline the goals and expectations of rural areas. The term "smart villages" describes rural communities that capitalize on their current advantages while also creating new chances to enhance their standard of living and contribute value.

In smart villages, knowledge, innovation, information and communication technology (ICT), the Internet of Things (IoT), and advanced technologies are utilized to improve both traditional and modern networks. Smart technologies and innovations may support citizen's quality of life, public services provision, efficient use of resources, and reduce environmental impact

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According to Adesipo et al., (2020) A "smart village" is characterized as a community that makes plans for future development based on technology while attempting to build on its current resources and strengths. However, it is sensitive to community and territorial boundaries, based on the needs and potential of each area. The emerging concept of the "smart village" describes rural communities and places that support them in embarking on new initiatives and expanding upon their existing resources and competencies.

(Debajit Palit et al., 2011), South Asian nations are concentrating on off-grid electricity for rural areas. Bangladesh, India, Sri Lanka, and Nepal have all implemented off-grid systems for rural electrification and have had positive outcomes.

(Sinha et.al., 2016), State and municipal governments in India have embraced the idea of "smart villages" to emphasize comprehensive rural development that is based on Mahatma Gandhi's vision. Adarsh Gram.

(Kaushik et.al 2016), The Sansad Adarsh Gram Yojana (SAGY) program was introduced on October 2, 2014, Mahatma Gandhi's birthday, to implement the smart village concept through lawmakers. Each member of parliament and minister has adopted a rural village and plans to turn it into a model village by 2019 in accordance with SAGY guidelines.

(Tomar et al., 2016), The integrated village development plan that encompasses personal, human, social, and economic elements is SAGY's vision.

Objective of the Research Paper

1. The major objective of this research to understanding the concept of smart villages and the role of smart villages to transforming India from developing to developed country.
2. To find out the challenges to transforming traditional Indian villages into smart villages.

Hypotheses

H_0: There is no significant role of smart villages to transforming India from developing to developed country.

H_1: There is a significant role of smart villages to transforming India from developing to developed country.

Research Methodology

The study's focus is both conceptual and descriptive. Information gathered from secondary sources, such as books, periodicals, journals, and newspapers etc. In order to efficiently and methodically compile statistics from several appellants, I have combined two of the most well-known social science research methodologies.

Impact of Smart Villages

The transformation of traditional Indian villages into "smart villages" is a progressive concept aimed at integrating advanced technology, infrastructure, and sustainable development to improve the living standards and overall quality of life in rural areas. It holds the potential to significantly impact the socio-economic and environmental landscape of India, but it also comes with its set of challenges.

Developing smart villages to improve rural communities' quality of life is similar to the more popular smart city notion. Smart village theory holds that contemporary energy availability may spur advancement in areas like clean water, productive enterprise, food security, health, and education. and sanitation, environmental sustainability, and participatory democracy, all of which in turn support further developments in energy access. Technological advancements in the supply and use of sustainable energy, local entrepreneurial capacities, and the integration of energy access with other development programs are enabling such revolutionary change.

1. **New technologies in education:** New educational technologies, such as desktop publishing, e-learning, and the creation of horoscopes for village residents who are interested. Village transportation to a cozy and secure area that improves quality.
2. **Locally Produced and Locally Consumed Energy:** In villages if the mountains, hilly area are present then use of solar energy & wind energy then energy is produce in that village itself & use for development of village.
3. **Contribution to Global Environment:** The system can reduce reliance on fossil fuels &contribute to reduction of greenhouse gases such as carbon dioxide. Energy consumption optimization 25-30% average energy saving.
4. **Electricity and Clean Energy:** Smart villages promote the use of renewable energy, particularly solar power, to provide reliable electricity. This results in better living conditions and more economical energy use.
5. **Connectivity:** The introduction of internet access and mobile connectivity enables villagers to stay informed, access government services, engage in e-commerce, and stay connected with the global

market.

6. **Water Management:** With smart irrigation and water conservation systems, villages can effectively manage water resources, addressing the issues of water scarcity and improving agricultural productivity.
7. **Digital Literacy:** Smart villages foster digital literacy, enabling villagers to use technology for educational purposes, job creation, and entrepreneurship, which can increase their income and reduce migration to cities.
8. **Agricultural Advancements:** The use of technology like drones, IoT, and AI in farming allows for precision farming, better crop yield, and reduced wastage. This aids farmers in expanding their market access and production.
9. **Skill Development and Employment:** With the rise of e-commerce, digital platforms, and local industries, rural employment opportunities can be expanded, creating jobs and reducing unemployment rates.
10. **Telemedicine and Healthcare:** Smart villages enable telemedicine services, improving access to healthcare in remote areas. Long-distance travel is less necessary because to digital health data and virtual consultations.
11. **Online Education and Learning Platforms:** Improved internet access provides educational resources to students in rural areas, bridging the education gap between rural and urban centres.
12. **Waste Management:** Smart village initiatives promote better waste management practices, such as waste-to-energy systems and composting, leading to cleaner villages and reduced environmental impact.
13. **Sustainable Agriculture:** The use of modern agricultural techniques and eco-friendly practices reduces the environmental footprint and promotes sustainable food production.
14. **For farmer E-learning**: facility that will be able to ask there quarries online.

Challenges in Transforming Traditional Villages into smart village in India

1. Lack of Knowledge and Resistance to Change

Lack of awareness among those utilizing contemporary technology is another issue with smart village programs in India. The public's experience with these smart technology initiatives has generally been negative for a number of reasons, including the fact that few people, particularly in rural India, are familiar with modern digital technologies, the Internet, and other modern technology, as with other parts of the developing world, who know how to efficiently use and apply modern digital technologies, such as "smart meters". Other limitations that are less important but nevertheless merit discussion include a lack of technological expertise, integration challenges, and a lack of knowledge and control over the fundamental services that are offered.

2. Budget Constraints

One of the biggest obstacles to the creation of smart villages in India is the limited budget. These constraints can hinder the implementation and sustainability of projects aimed at improving infrastructure, technology, and services in rural areas. Here are some key aspects of budget constraints in the context of smart villages. Most government budgets prioritize urban development, leaving limited resources for rural areas. Funds are often spread across various schemes (e.g., Digital India, PMGSY, NRLM), making it difficult to consolidate for a single "smart village" approach. Bureaucratic delays and corruption can reduce the effective utilization of funds.

3. Sustainable Technologies

The development of Smart Villages heavily relies on sustainable technologies. Innovations in architecture include water management techniques, smart grid technologies, and renewable energy sources. Smart villages are models of environmentally responsible living since research shows that integrating these technologies not only improves resource usage efficiency but also lessens the impact on the environment.

4. Water Management: Sustainable Practices for Rural Resilience

One of the most important features of SMART Village architecture is sustainable water management. The main goals of architectural interventions are wastewater treatment, effective irrigation systems, and rainfall collection. Research shows that these methods protect rural people' access to clean water while simultaneously addressing the problem of water scarcity and enhancing their general resilience.

5. Poverty as a constraint of smart village

Poverty is a significant constraint for the development of smart villages in India in several interconnected ways. Poverty creates a cycle of deprivation that directly hinders the technological, infrastructural, and social advancements needed for smart village development. To break this cycle, poverty alleviation must go hand-in-hand with smart village planning — through inclusive education, public-private partnerships, community engagement, and scalable low-cost innovations.

6. Social Inequality as a challenge for smart village

There is a risk that not all villagers will equally benefit from the smart village initiatives, leading to disparities within communities. Women, the elderly, and marginalized groups may be left out if they lack access to or knowledge of the new technologies.

7. Sustainability Concerns

The long-term sustainability of smart village models depends on continuous investment in technology, maintenance of infrastructure, and addressing potential environmental impacts. If these aspects are neglected, the systems may fail to deliver lasting benefits. There's also a risk of overdependence on technology, which could lead to issues if systems fail or become outdated.

8. Government and Policy Coordination

Successful transformation into smart villages requires robust policies and coordinated efforts between the central and state governments, local authorities, and the private sector. Misalignment or lack of efficient governance could hinder progress.

Conclusion

Transforming traditional Indian villages into smart villages holds immense potential to uplift rural communities, improve livelihoods, and contribute to sustainable development. However, to realize these benefits, it is essential to address the infrastructural gaps, ensure the inclusivity of technology adoption, invest in skill development, and provide adequate financial support for the long-term success of these initiatives. The process requires careful planning, collaboration, and a holistic approach that considers the unique socio-economic conditions of each village. It also promotes the improvement of competitiveness in rural regions within local, regional, national, and global frameworks. By being territorially empowered and locally anchored, the concept emphasizes the importance of caring not only for the quality of life and working conditions of rural residents but also for the natural and cultural environment. For this reason, it can be broadly used in formulating policies and development strategies aimed at strengthening the persistence and sustainability of rural areas.

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