



## Identifying Strategies to Make Villages Smarter with the Aim of Improving the Quality of Life (Case Study: Kalar County, Sulaymaniyah Province, Kurdistan Region)

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### Abstract

**Purpose-** The widespread use of virtual platforms has become a common practice in present management, and rural areas are identified as a sector that can greatly benefit from this technology. Statistic data in the field of communication and information technology exhibit a significant increase in internet access in rural areas, a trend that is on the rise globally. The successful implementation of smart village initiatives in Asia shows a promising way to improve life in rural areas, overcome existing challenges, prevent the collapse of social structures, and counteract the problem of rural exodus. It can be argued that by advancing information technology and smart village initiatives, life quality in rural areas can be positively impacted.

**Design/methodology/approach-** The research population comprised the entire statistical community of four districts in Kalar County. Three villages were randomly selected from each district, resulting in a total of 150 samples from 262 households, using the Cochran formula with a 5% error rate. The reliability of the questionnaire was confirmed through content validity and Cronbach's alpha.

**Finding-** The results of this study indicated that the existing infrastructure for smart village development in the rural areas of Kalar County is in an unsatisfactory condition. Additionally, the level of knowledge and information of residents regarding the smartification process in the study area is insufficient. Moreover, the effectiveness of this emerging process in improving the life quality for the local population was not as impactful as expected. The driving and inhibiting factors affecting the development of smart villages in Kalar County do not align with optimistic expectations hindering the desired outcomes.

**Keywords:** Smartification, Smart village, ICT strategy, Rural development, Kalar County.

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## 1. Introduction

Information and Communication Technology (ICT) is a broad term encompassing a diverse range of technologies, from simple ones such as text messaging services to advanced items, namely sophisticated software solutions. Due to its cost-effectiveness, ICT has been widely adopted in rural areas and the agricultural sector, with the highest usage prevalence observed in rural regions. The advantages of utilizing ICT in rural areas include providing an affordable means of connectivity, facilitating cost-effective execution, online storage and transfer of information, and the emergence of efficient new business models. Additionally, it leads to innovative collaboration methods and increased demand for agricultural and rural information services, all of which directly impact the improvement of rural residents' life quality (György et al., 2011: 352). As part of the global digitalization trend, the Internet of Things (IoT) facilitates the transfer and secure sharing of data by connecting physical entities to the internet and offers the potential to enhance the quality of rural life (Dlodlo and Kalezhi, 2015: 16-17). Moreover, the benefits of investing in the development of smart villages are claimed to be twofold. These initiatives benefit residents by making their lives more straightforward while contributing to the creation of a more powerful, resilient, independent, and interconnected community. Smart villages also assist in the efficient utilization of available resources, fostering community and belonging development, and independence (Smart Villages, 2020).

Although the concept of smart villages is often associated with agriculture, it extends beyond that scope. In other words, it encompasses a broader range of heterogeneous activities primarily supported by technology, serving as a tool to enhance services in rural areas. It facilitates rural performance, leading to overall progress for rural residents and an enhancement in their life quality. (Plochá, 2019: 595-594). The European Commission (EC) refers to smart villages as rural communities that utilize their current benefits, strive for their digital development, and simultaneously support daily activities related to improving the life quality and living standards. This involves reassessing public services and

considering environmental aspects in every practical aspect of it (Food, Farming, Fisheries. European Commission, 2020). In a similar vein, The European Network for Rural Development (ENRD) defines this concept as follows: smart villages pertain to communities in rural areas that strategically use local strengths and opportunities. Through innovative solutions, they enhance their resilience, aiming to develop and implement strategies for the improvement of their economic, social, or environmental conditions. Embracing solutions provided by digital technologies, they rely on the creation of innovation and a participatory approach to execute their strategies (ENRD, 2020). Furthermore, they benefit from collaboration and cooperation with other communities and stakeholders in rural and urban areas. The initiation and implementation of smart village strategies may be based on existing innovations and funded by various governmental and private resources. The participatory approach involves active community participation in formulating smart village strategies and decision-making. During the implementation phase, the participatory approach ensures that capacity-building needs and training for individuals are adequately addressed (European Union Pilot Project, 2019). Utilizing digital technologies solely is insufficient for creating smart villages. Alternatively, digital technologies such as ICT, the use of big data or innovations in connection with the IoT are also required. These technologies serve as a lever enabling smart villages to become more agile, better utilize their resources, and enhance the appeal of rural areas and the life quality for their residents (European Union Pilot Project, 2019).

Trinity College Cambridge defines smart villages as a modern global approach for off-grid communities. This concept aims to assist policymakers, donors, and economic and social planners in electrifying rural areas worldwide, with a special focus on Asian and African countries (Alternative Energy Solution for the 21st Century, 2015).

In other words, this notion aims to overcome real barriers to energy access in rural areas, especially in developing countries, using technological, financial, and educational methods. Countries of the third world and rural areas have the potential to enhance the quality of rural life through the improvement of information technology and the

smartification of villages (Bahramian, 2019: 37). For instance, in India, the quality of rural life improved when the smartification of villages was achieved (Rao, 2007: 75).

Kalar County is located within the administrative region of Garmian Province, approximately 120 km south of Sulaymaniyah Province. This area is situated along the Sirwan River, less than 25 km away from Qasr-e Shirin city on the Iran-Iraq border. There has been an increased focus on information technology and internet usage in these rural areas, recently. Considering these circumstances, adopting strategies that contribute to the process of smartifying villages is of paramount importance. As it can lead to an improvement in the lives of rural dwellers and a general improvement in their life quality. The aim of this study was therefore to identify strategies for smart villages in Kalar County, Sulaymaniyah in the Kurdistan Region to improve the life quality of rural residents. The research questions are as follows:

- A. What is the level of knowledge and information of the local population on smartification in the villages of Kalar County?
- B. What affects does the villages smartification have on the life quality of indigenous people in the villages of Kalar County?
- C. What managerial components are effective in achieving smartification in the villages of Kalar County?

## 2. Research Theoretical Literature

Class-based creativity and smartification: Slee et al. (2015) in Scottish villages and Scalluna-Orkaw et al (2016) in other rural areas of Europe focused on the redefinition of the class by McCranahan and Wu (2007a; 2007b). Accordingly, it can be assumed that the different size of the creative class in rural areas is related to different economic performances. However, it is not clear whether a higher level of development results from the presence of a larger creative class or whether a creative class moves to an area because of higher economic output. Nevertheless, the presence of a higher percentage of individuals in the creative class may logically be used as an exploratory hypothesis to examine the relationship between the size of the creative class and smart and less smart villages.

Social capital and smartification: Social capital has been identified as a key determinant of different

economic performances in the south and north of Italy (Putnam, 1993). Hence, social innovation can be viewed as a robust outcome of social capital, indicating a willingness among individuals to engage in civic initiatives that exert a positive influence on economic performance. This potentially explains different economic performances (i.e., smartness) at the micro-level. Nevertheless, as reported by Putnam (1993), social capital is positioned alongside other forms of capital that are likely to undergo spatial variations. However, variations in social and human capital, particularly disparities in the bridging and bonding aspects of social capital, could serve as exploratory hypotheses distinguishing between smart and less smart villages.

Social capital, innovation, and smartification: Many of these theories converge in acknowledging substantial spatial differences, which can be attributed to factors like economic structural elements, shifts in human and social capital, and local knowledge. Considering these differences, can place-based development (Barca, 2009; Barca et al., 2012) be regarded as a means to comprehend the diversity of capabilities in space and formulate subtle regional or local strategies? In larger regions, it may be challenging to shape place-based development strategies for empowered villages. Definitely, in dominant discourses based on technology regarding smart villages, apart from the largely discredited linear modernization theory, there is little presence connecting to any of these main theories. Indeed, single-line theories criticized by Van der Ploeg and Long (1993) are primarily considered irrelevant to more distant and peripheral areas. Whereas, they are widely supported within the framework of digitally-based smart village models. However, the discourse of social capital/innovation has strong theoretical roots, well demonstrated in Putnam et al (1993) and other studies.

### 2.1. Literature Review

ICT can enhance urban-rural relationships. In smart villages, this relationship is primarily based on economic variables. The increase in economic power in providing services to citizens, attention to providing information and individual experiences in the construction of residential structures, utilizing urban experiences in rural area improvement, and increasing services in villages



for leisure activities are among the impacts of ICT in rural areas. Additionally, the increase in personal investment in urban and rural infrastructure, along with enhancing the role of urban and rural institutions in improving urban-rural relations, contributes significantly to the transformative effects of ICT in rural areas (Roumiani et al., 2018). A study by Anabestani & Javanshiri (2024) on smart growth, aims to examine smart development in rural areas of the county and provide a framework for this strategy. The results presented that in the hierarchical analysis process, economic indicators had the greatest impact on the formation of smart rural development. Additionally, examining various smart development indicators at the village level, indicated less favorable conditions for physical and environmental indicators in villages (Anabestani & Javanshiri, 2016). Furthermore, Khajeh Shahkooi demonstrated that the economic, social, physical, and environmental dimensions of IT significantly impacted the rural life quality (Khajeh Shahkooi, 2013).

The development of rural areas is achieved through the concept of a smart village, considered as one of the best ideas for improving the life quality by focusing on the intelligent planning of rural spaces. This development includes economic and social variables of rural areas (Nofi & Eila, 2019). Rachmawati et al (2018) investigated in Indonesia, and expressed that smart cities and smart villages are distinct entities with varying sizes and regional challenges. They also highlighted that not all elements present in smart cities are universally applicable in all regions (Rachmawati, 2018). The concept of a smart village has evolved into a complementary option for rural development in the contemporary global era. In other words, this concept provides a solution to enhance the life quality in rural areas, creating opportunities for villages to engage in complementary activities or generate added value for their existing activities (Ahlawat, 2017: 202).

The notion of the "smart village" was extended by Van Gool & Holmes, who argued that by developing various sectors such as health, education, food security, environment and general quality of life, the improvement of rural areas becomes feasible through smart village initiatives (Van Gool & Holmes, 2020). In sustainable urban and smart village research, Visvizi & Lytras (2018)

provide a comprehensive overview of social issues, and various economic and social aspects pertinent to smart cities and smart villages. They claim that policy design, strategic formulation, case studies, technology-related issues, tools, and applicable systems are crucial tools for improving life quality in smart villages. Accordingly, policymaking in rural areas under the influence of information technology can lead to improvement (Visvizi & Lytras, 2018).

Smart villages within the European Union and beyond have concluded that the smartification of villages can mitigate population decline and rural migration, serving as a tool for population retention (Visvizi & Lytras, 2018). Patnaik et al. (2020) published an article entitled "Smart rural technology: concepts and developments" which proposed various approaches to sustainable smart village development. They also provided examples illustrating how smart village concepts connect with technology, agricultural management, and water resources. Then, they presented the concepts of renewable energy management and concluded by exemplifying the use of smart technology to address rural challenges (Petnaik et al., 2020). Similarly, Kwar et al (2020) demonstrated how the implementation of IoT solutions in smart villages can lead to improved life quality for rural residents (Kwar et al., 2020). Besides, Zawratnek et al () focused more on individuals living in these areas, emphasizing that technology should serve the people rather than the other way around. They argue that in some rural areas, the use of IT has contributed to an increase in social indicators such as inequality and the digital divide, leading to a decrease in the life quality for certain groups (Zavratnik et al., 2020).

Sadeghloo et al. (2023) published a paper entitled "Analyze of the factors influencing the acceptance of ICT in rural communities, Case study: Shandiz region villages". They concluded that the level of acceptance of new technologies among the studied villagers is moderate, with the most influential factors being educational and facility-related, cultural and belief-related, economic, and personal factors. Furthermore, Anabestani & Javanshir (2024) published the "Effectiveness of digital technology on the formation of creative rural infrastructures in peri-urban settlements, focusing on Mashhad". They documented that from the perspective of rural creative infrastructures, using

government incentives, such as tax exemptions and housing and employment facilities, to attract and prepare the young population can be suggested. Similarly, In their article titled "Drivers of electronic marketing in rural areas (Case study: Khoshab County)," [Jalalian et al \(2023\)](#) argued that the government's efforts to achieve non-discriminatory access to information technology and electronic marketing are primarily characterized by the enactment of necessary laws. They also emphasized the intermediate modification of legal and regulatory structures, the quality and ease of access to supporting institutions, market competitiveness in agriculture, the increase in the share of electronic transactions, the enhancement of trust in this type of marketing, network security in electronic marketing, and other factors, respectively, hold subsequent significance. In another study, [Fathi & Azizpanah \(2021\)](#) published a paper titled "Investigating factors affecting the use of ICT -based training in agriculture in northern Khuzestan" claimed that considering the greater impact of agricultural income on the use of ICT-based training, it recommended to adjust the cost of the Internet for web-based agricultural training platforms as much as possible.

### 3. Research Methodology

The present research, considering the nature of the subject, is practical and developmental, in terms of scope, it is a case study. Methodologically, it falls into the category of descriptive-analytical research. To elucidate the findings, a descriptive method was employed, and for hypothesis testing, an analytical

approach was utilized. Furthermore, to assess the level of usage and deployment of facilities in the investigated villages, key indicators and formulated questionnaires were employed, and evaluated through a survey method based on documentary studies.

The statistical population included the villages of Zamangeh, Cheh Mah Besmila, Zhaleh-ye Seh Far, Piazajareh, Dormilan Kharavv, Kool-e Jooi Hamzeh Khan, Seh-ye Mahmoud, Pirehsh, Zhaleh-ye Hajighader, Bistaneh, Tehm Tehmeh, Bahrageh La, totaling 262 households (information provided by the Garimyan Governorate as of November 20, 2013).

Considering the similarity of villages within each district in terms of geography and information technology facilities, three villages from each district were randomly selected as a simple random sample, resulting in a total of 12 villages for sampling. The sampling in each village was based on a systematic random method (based on household units). The sample size determination used Cochran's formula, resulting in 150 households with a 5% margin of error. The distribution of the sample size at the district level was proportionate to the number of villages in each district, taking into account their access to facilities and also considering the distance and proximity of the county's villages from the county center. Hence, the list of villages and necessary maps were obtained from the Garimyan Regional Office (Governorate agency of the region). The villages were selected proportionately in a manner that maximized alignment with current conditions and minimized possible errors([table 1](#)).

**Table 1. Research sample**

County	Village name	Household	Population	Sample number
Nahevand(Central)	Zamavengah	46	216	27
	Che me besmila	16	93	9
	Zhale se fer	14	95	8
Rezgari	Piaze jar	30	245	8
	Dormilan kharoo	10	57	6
	Koole joy Hame khan	13	67	12
Pebaz	Se y Mahmood	42	170	10
	Pirehsh	17	110	19
	Zhale haji ghader	11	55	6
Sheikh tavil	Bistane	31	151	18
	Te me te me	21	102	6
	Be re gel	11	40	12
Total		262	1401	150

To obtain the samples, the statistical section of the governorate was consulted, and the statistical list for the year 2013 was prepared. The samples were selected by dividing them regionally into four districts, and three villages were chosen from each district. Subsequently, the first sample was randomly selected, and the remaining samples were chosen systematically based on the level of facilities (in three levels). Therefore, in the selection of samples in each district, there were three levels of access to facilities.

In the present study, two methods of data collection, namely documentary and field methods, were employed to gather information and identify samples from the residents of the target villages. The obtained data were analyzed using a descriptive-analytical approach. In the initial stage, descriptive statistics such as tables, means, frequencies, and percentages were utilized to describe the data. Subsequently, Spearman's correlation and regression were used for further analysis (Table 2).

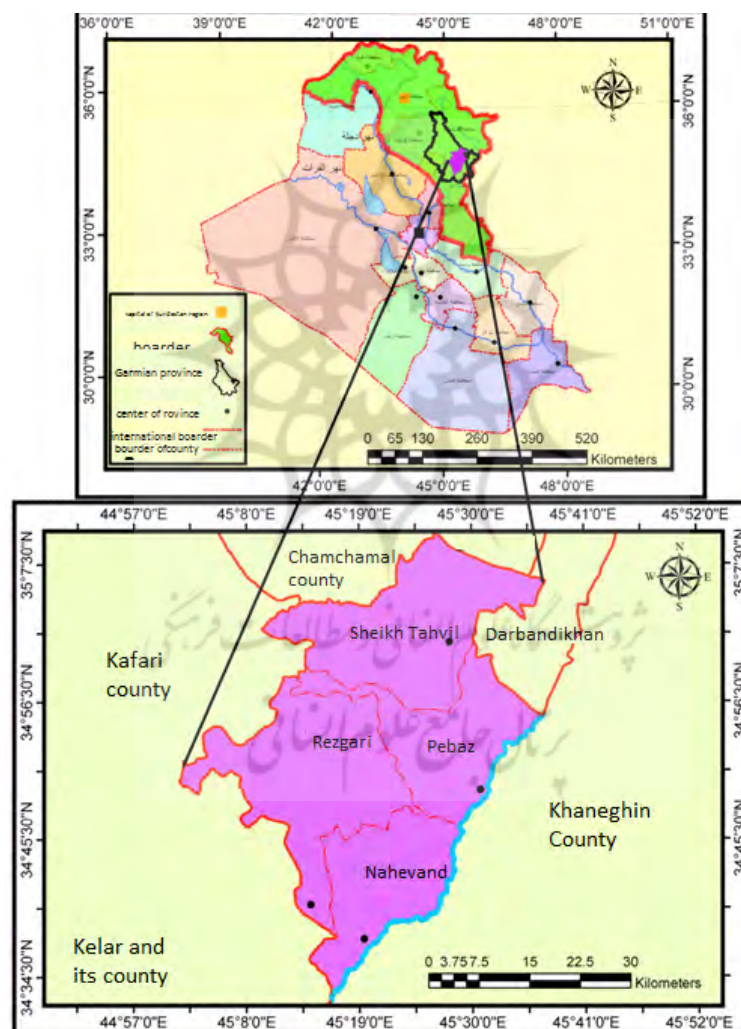
**Table 2. Dimensions, aspects, and indicators of the smart village model**

Table 2: Dimensions, aspects, and indicators of the smart village model			
	Dimensions	Aspects	Indicators
1	Government	Public services	Management services
			Using ICT to provide services to society
			Complaint handling services
		Transparency	Transparency of government information
			Financial transparency
		Policy	leadership
Public participation			
2	Technology	ICT	Internet accessibility
			Information technology infrastructure
		Suitable rural technologies	sensor
			Cloud computing
3	Resources	Natural resources	Water availability
			Energy consumption
			Agriculture
		Financial resources	Fishing
			livestock
			Human Resources
		Education level	
		Open-mindedness	
		4	Village services
Educational services			
Entrepreneurship			
Economic services	Job availability		
	Economic institutions		
	Distribution/logistics facilities		
5	Village services	Economic services	Entrepreneurship
			Job availability
			Economic institutions
			Distribution/logistics facilities
5	living	Security and welfare	Waste management
			Environmental protection
			Public security
			Crisis Management
		Access to public facilities	Green space facilities
			Sports area facilities
			Banking facilities
			Road and bridge facilities
6	Tourism	Village capability	The identity of the village
			Tourist destinations
			Brand design for the village (branding platform)

	Dimensions	Aspects	Indicators
		The brand name of the village	Culture and traditions

Kalar County belongs to the Sulaymaniyah Province of Iraq. This area is located in the eastern part of Garmian Province, within the administrative divisions related to the Kurdistan Region. The Sirwan River, with a length of 69 km, is the eastern border of the county, neighboring Khanqin County in the eastern region. Furthermore, Kalar is bounded to the northeast by Darbandikhan County and the mountain ranges of

Qarah Dagħ County, to the northwest by Chamchamal County, and the west and southwest by Kofri County. This county constitutes 17.6% of the total area of Garmian Province, which is divided into four districts (sub-counties), namely Central, Rozgari, Peybaz, and Sheikh Tavi (Ministry of Planning of Kurdistan Region Iraq, 2013: 35) (Figur 1).



Figur 1. location Kalar county, on Iraq map

#### 4. Research Findings

The formulated questions were designed to comprehensively cover all influential aspects of establishing an intelligent online system and

utilizing emerging ICT. These aspects include attention to the diversity of government services in the information technology and communications area, improvement of infrastructures, regional



development strategy, internet access levels, deployment of services, and interaction with internet-based social networks and their management, as well as support and security for the

use of this technology. It was formulated in nine items and an equal number of questions. The results are presented in [Table 3](#).

**Table 3. The current infrastructure status for villages smartification of Ksalar city**

Number	Effective variables in current infrastructures for smartification	Mean	Standard deviation	Variation coefficient	T test	Sig
1	Expansion and dispersion of government services based on ITC	3.38	1.11	0.33	4.173	0.000
2	The antenna coverage level of the village based on mobile phones used in all areas	3.75	1.15	0.30	8.006	0.000
3	Internet availability in villages	2.22	0.79	36.0	-12.044	0.000
4	Using internet services and social networks in villages	2.77	0.83	0.30	-3.440	0.000
5	Adequate management of internet services	2.76	0.76	0.27	-3.883	0.000
6	Distribution of important logistics facilities required by ITC	4.56	0.62	0.14	30.901	0.000
7	Improvement of infrastructure based on ITC	2.17	0.74	0.34	-13.690	0.000
8	Regional development strategy based on ITC	4.52	0.56	0.12	32.992	0.000
9	Internet security in villages	2.02	0.78	0.39	-15.363	0.000

As for existing infrastructure indicators for smart rural development in Kalare County villages, the results revealed some key insights. In the under-study villages, a notable expansion in the utilization of information technology has been observed through the development of government infrastructures. However, the distribution of information technology services was uneven, with some areas having better coverage than others. This phenomenon caused a significant disparity in the utilization of information technology benefits among users. On the one hand, information technology, and communication are exclusively found within the framework of smartphones, and there has been no presence of information technology and internet networks outside of these devices, including wired and wireless connections. This discrepancy has led to significant differences in the use of information technology in certain villages due to blind spots and areas outside of internet coverage. Additionally, internet usage has popularized social networks such as Facebook, Twitter (X Network), WhatsApp, etc., despite e-government in Iraqi Kurdistan being simple and rudimentary. Therefore, when discussing

information security, concerns are not particularly significant among the people because there is not much financial exchange on the internet. However, the bandwidth (referred to as internet speed in common terms) is satisfactory, and users express contentment with it. Ultimately, there is no civil strategy for the development of information technology and communications in Iraq. Consequently, the expansion of the internet in rural areas lacks a clear framework. The Kurdistan government does not have a coherent policy on this matter.

#### ***4.1. The Level of Indigenous People's Knowledge and Information for Smartification in Kalar County's Villages***

Three items such as the public knowledge level to utilize internet services, generating interest, encouraging voluntary internet-centric activities and services, and establishing environmental education through the internet were influential factors in the indigenous people's level of knowledge and information for smartification in the villages of Kalar County ([Table 4](#)).



**Table 4. The knowledge and information level of local people for smartification in the villages of Kalar city**

Number	Effective variables in current infrastructures for smartification	Mean	Standard deviation	Variation coefficient	T-test	Sig
1	Encouraging and motivating Internet-based volunteer activities and services	2.94	0.93	0.32	-0.7	-0.485
2	Having general knowledge of using Internet services	4.04	0.90	0.22	14.244	0.000
3	Environmental training through the Internet	2.86	0.93	0.32	1.85	0.066

#### 4.2. Impacts of villages smartification on the life quality for indigenous people in Kalar county's villages

As for items of follow-up by officials in planning and implementing digitization and smartification, a majority of the sample members expressed satisfaction with the local authorities' actions. Whereas, addressing complaints and providing responses through the internet was a relatively new concept for many participants. Some were not aware of such services, and the results indicated a lack of seriousness in acknowledging the existence of such services. The level of public (and financial)

transparency in the implementation of government plans through the internet was also indicative of the absence of transparency in this regard. Furthermore, the plans proposed by the authorities did not address whether the selection of relevant officials was based on their knowledge of information technology. In the question regarding support for rural elderly individuals through information technology, apart from cultural support, there was a lack of planning and execution in this regard. Attention to the role of women and the promotion of technology-based knowledge for them were also evidently neglected, as confirmed by the obtained results (Table 5).

**Table 5. Effects of village smartification on the people's life quality in the villages of Kalar County**

Number	Effective variables in current infrastructures for smartification	Mean	Standard deviation	Variation coefficient	T-test	Sig
1	Necessary coordination between local managers and implementation of joint activities	2.86	0.76	0.26	-2.256	0.026
2	Tracking officials in the planning and implementation of digitalization and making things smarter	2.05	0.74	0.36	15.67	0.000
3	Complaint handling and answering services through the Internet	4.20	0.95	0.23	15.549	0.000
4	Public (and financial) transparency in the implementation of government plans and programs through the Internet	4.71	0.46	0.10	45.757	0.000
5	The knowledge about IT in the selection of relevant officials	4.66	0.49	0.10	41.558	0.000
6	Supporting the rural elderly through IT	4.37	0.82	0.19	20.348	0.000
7	Attention to the women contribution and promotion of knowledge based on ITC	4.43	0.76	0.17	22.995	0.000
8	Implementation of plans and actions of officials through ITC	2.78	0.76	0.27	-3.552	0.001
9	The priority of virtual education and training services	3.93	0.89	0.23	12.881	0.000
10	Exchange of opinions and opinions of residents in the village through the Internet	2.35	0.82	0.35	9.769	0.000

Number	Effective variables in current infrastructures for smartification	Mean	Standard deviation	Variation coefficient	T-test	Sig
11	Improving the healthcare system through the use of the modern internet and its compatibility with the world's modern knowledge	2.67	0.74	0.28	-5.426	0.000
12	Reforming and improving the formal education system using ITC	4.41	0.60	0.12	28.566	0.000
13	Appropriate business plans and programs on the Internet	40.06	0.84	0.21	15.505	0.000
14	Creating job opportunities based on the Internet	3.72	1.11	0.30	7.974	0.000
15	Using the internet of economic institutions to earn a living	2.15	0.82	0.38	-12.565	0.000
16	Reforming and improving the welfare system and virtual and online social services	4.11	0.85	0.21	15.898	0.000
17	Utilization of crisis management from ITC	4.17	0.87	0.20	16.42	0.000
18	Strengthening virtual tourism infrastructure	4.63	0.56	0.11	37.936	0.000
19	The existence of websites catering to rural tourism enthusiasts	4.72	0.45	0.10	46.76	0.000
20	The presence of suitable programs for more effective online sales of agricultural products	4.35	0.70	0.16	23.799	0.000
21	The availability of suitable programs for more effective online sales of agricultural products	4.55	0.54	0.12	35.191	0.000
22	Establishment of exclusive online programs and support by authorities for manufactured products	4.58	0.55	0.11	35.393	0.000
23	Showing traditional relations and rituals continuously on the Internet	4.59	0.55	0.12	35.393	0.000
24	Development and enhancement of regional culture, considering the characteristics and needs specific to each area on the internet	4.60	0.54	0.1176	26.296	0.000

As for findings derived from an examination of the prioritization of virtual educational and training services through the internet, it is noteworthy that while this item attracted heightened attention globally concomitant with the relative increase in internet utilization attributable to the COVID-19 pandemic, such services were not favorably received within the investigated region.

Residents generally had a positive view of exchanging opinions through the Internet and online social networks. The shift towards digital health programs, including online registration and traceable conditions, was seen as a positive development in enhancing healthcare services. However, the outlook for reforming the formal education system using ICT appeared less optimistic, with survey responses expressing dissatisfaction and skepticism about potential improvements. While entrepreneurial initiatives on the internet typically evolve organically in many societies, the acceptance level within the studied

area was not accepted. Creating job opportunities through internet-based platforms faced challenges due to lower education levels and limited scientific literacy. On the other hand, the use of the Internet by economic entities for livelihood purposes was more accepted. Efforts to improve the social welfare system through virtual and online services revealed inadequacies. Despite the acknowledged importance of leveraging ICT for crisis management globally, its integration was insufficient in the studied area. Improving online tourism facilities, especially now and particularly after the COVID-19 pandemic, which has made countries heavily dependent on the tourism industry, was not effective. The investigation into the existence of virtual banking facilities within the administrative system of Iraq highlighted explicit restrictions. Tourist information sites about villages, though present to some extent, lacked purposeful functionality, supported by obtained

findings. Programs aiming to enhance online sales of agricultural products faced dissatisfaction among farmers. Moreover, exclusive internet programs and official support for manufactured goods failed to attract significant investments. The display of traditional rituals and ceremonies on the internet, while present in an unplanned manner, lacked purposeful functionality. The obtained results confirmed it. Similarly, the development of regional culture on the internet, considering the unique characteristics and needs of each locale, occurred in a fragmented and unplanned manner, lacking purposeful functionality.

#### 4.3. Effective management components for achieving smartification in Kalar County villages

The level of proper utilization of ICT in providing services, as an encouraging factor for future

internet service usage, was moderately satisfactory. Whereas, observations on the management structure for enhancing the level of ICT use indicated a lack of proper planning and management structure. Additionally, observations suggested the absence of necessary and sufficient planning and management structure. Regarding public participation and support on the Internet platform, the mean value of this indicator was appropriate. This result can be attributed to the use of social networks, regional political parties, and the increasing use of the internet in daily life.

In utilizing natural resources for educational programs on the internet, this item also fell below an appropriate level. It can be claimed that the existing natural capacities in these regions have not been optimally utilized (Table 6).

**Table 6. Distribution of effective management components on the villages' smartification of Kalar County**

Number	Effective variables in current infrastructures for smartification	Mean	Standard deviation	Variation coefficient	T test	Sig
1	Proper use of ITC in providing services	2.67	40.7	80.2	-5.526	0.000
2	Optimal management of the resources needed to use IT	4.32	0.67	0.15	24.174	0.000
3	Adequate management to improve the IT using	4.2	0.84	0.20	17.592	0.000
4	Public participation and their support on the Internet	2.57	10.8	0.31	-6.487	0.000
5	Using natural capacities for educational programs and plans on the Internet	54.3	0.73	70.1	22.513	0.000

Table 6 shows that the digitization of rural areas is influenced by the level of local knowledge. Higher knowledge levels are correlated with increased potential for using information technology. Infrastructure and its development play a significant role in making information technology

more accessible. When infrastructure improves, there is greater use of information technology. Consequently, local management and participation are essential solutions for bringing more technology to rural areas (table 7).

**Table 7 - Correlation of Variables (Smart Village Development as the Dependent Variable)**

Dependent variable	Independent variable	Correlation coefficient	Sig
Rural Smartification	Native knowledge level	0.73	0.003
	Infrastructures	0.77	0.00
	Management	0.80	0.002

Table 8 demonstrates the impact of digitization on the quality of rural life. As the smartification of

rural areas improves, there is a corresponding enhancement in the overall life quality.

**Table8. the impact of digitization on the quality of rural life**

Dependent variable	Independent variable	Correlation coefficient	Sig
Life Quality	Rural smartification	0.79	0.002

A stepwise regression analysis was conducted to assess the relative importance of variables, revealing a coefficient of determination of 0.62. The outcomes revealed that the level of local knowledge stands out as the most

influential variable in the progression of rural smartification. In the next phase, infrastructure plays a decisive role, closely followed by management (Table 9).

**Table 9. regression**

Variables	B value	$\beta$
Constant value	1.75	
Native knowledge level	0.39	0.48
Infrastructures	0.27	0.39
Mangement	0.33	0.42

## 5. Discussion and Conclusion

The results demonstrated that all influential aspects structurally exist to establish a smart internet system and leverage innovative ICT in the villages of Kurdistan, Iraq. However, serious challenges in utilizing ICT persist. Constraints in governmental services related to ICT, the necessity for infrastructure improvement, regional development strategies, internet accessibility, and the deployment of services and interaction with internet-based social networks and their management, as well as support and security for technology use, are essential. Nevertheless, a considerable general knowledge among villagers of utilizing internet services has been observed. Initiatives taken by governmental and non-governmental agencies in rural areas include creating interest and promoting voluntary activities on the Internet, as well as environmental education through the Internet for scientific development and more effective use of ICT services. However, internet usage in villages is limited to social networks and communication platforms. Electronic governance has not significantly developed in Iraq. Further, ore, internet-based financial transactions and marketing activities do not substantially take place in rural areas. Therefore, it can be argued that the lack of alignment between smartification and the life quality for indigenous people in the villages of Kalar County is apparent.

For the development of ICT and the enhancement of the current utilization of ICT, coherent management, public participation, and the utilization of existing natural capacities are necessary.

In summary, internet usage is primarily limited to social networks and other applications. Despite the development of ICT, the smartification conditions of the villages in the study area are generally unfavorable, and the process of smartifying villages is still in its early stages. While partial aspects seemed proportionate in several dimensions, the overall findings indicate a lack of planning and purposefulness in this regard. The Kurdistan Regional Government must adopt comprehensive policies for the development of smart villages by formulating appropriate strategies and models.

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## Authors' contributions

The authors equally contributed to the preparation of this article.

## Conflict of interest

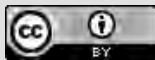
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## References

- Ahlawat, J. (2017). Smart villages, information communication technology and geographical information system. *International Journal of Current Trends in Science and Technology*, 7(8), 20232-20238. <https://api.semanticscholar.org/CorpusID:134285569>
- Alternative Energy Solution for the 21st Century. (2015). Retrieved November 7. (<http://www.altenergy.org/>)
- Anabestani, A. & Javanshiri, M. (2024). Analysis of the effectiveness of digital technology on the infrastructure of creative village formation in peri-urban settlements (Case: Mashhad metropolis). *Rural Development Strategies*, 10(2), 137-164. [In Persian] <http://DOI:10.22048/rdsj.2022.338764.2013>
- Anabestani, A., & Javanshiri, M. (2016). Investigating and analyzing smart rural development indicators. *Journal of Research and Rural Planning*, 5(16), 187-212. <https://doi.org/10.22067/jrrp.v5i4.61113>
- Bahramian, Sh. (2009). The role of information and mass media in development. Available on the Information Reform Information Center website. [In Persian]
- Barca, F., McCann, P., & Rodríguez-Pose, A. (2012). The case for regional development intervention: place-based versus place-neutral approaches. *Journal of Regional Science*, 52(1), 134–152. <https://DOI:10.1111/j.1467-9787.2011.00756.x>
- Cvar, N., Trilar, J., Kos, A., Volk, M., & Stojmenova Duh, E. (2020). The use of IoT technology in smart cities and smart villages: similarities, differences, and future prospects. *Sensors*, 20(14), 3897. <https://www.mdpi.com/1424-8220/20/14/3897>
- Dlodlo, N., & Kalezhi, J. (2015, May). The internet of things in agriculture for sustainable rural development. In *2015 international conference on emerging trends in networks and computer communications (ETNCC)* (pp. 13-18). IEEE. <https://ieeexplore.ieee.org/abstract/document/7184801/>
- Escalona-Orcao, A. I., Escolano-Utrilla, S., Sáez-Pérez, L. A. & Sánchez-Valverde García, B. (2016). The location of creative clusters in non-metropolitan areas: A methodological proposition. *Journal of Rural Studies*, 45:112-122 <https://DOI.10.1016/j.jrurstud.2016.03.007>
- Fathi, R., & Azizpanah, A. (2022). Investigating factors affecting the use of information and communication technology-based education in North Khuzestan agriculture. *Rural Development Strategies*, 8(1), 55-69. [In Persian] <https://DOI:10.22048/rdsj.2021.271002.1914>
- Food, Farming, Fisheries. European Commission. (2020). Available online: [https://ec.europa.eu/info/food-farming-fisheries\\_en](https://ec.europa.eu/info/food-farming-fisheries_en) (accessed on 8 August).
- György, T.; Bagazonzya, H.; Ballantyne, P.; Belden, C.; Birner, R.; Castello, R.D. (2011), Edge, P. ICT in agriculture: Connecting smallholders to knowledge, networks, and institutions. World Bank, 64605, 1–428. <https://documents1.worldbank.org/curated//646050ESWOP11801ture0e0Sourcebook12.pdf>
- Jalalian, H., Sultanabadi, M., & Afrakhteh, H. (2024). Drivers of electronic marketing in rural areas (Case study: Khoshab County). *Journal of Village and Sustainable Development of Space*, 4(4), 65-89. [In Persian] <https://DOI:10.22077/vssd.2023.6130.1172>
- Khajeh Shahkooei, A. (2013). Analysis of the impact of ICT on the life quality of villagers: A case study of Qoranabad and Esfahankaleh villages, Gorgan city. *Geographical Space Planning*, 3(1), 103-120. [In Persian] [https://gps.gu.ac.ir/article\\_5386.html](https://gps.gu.ac.ir/article_5386.html)
- Ministry of Planning (Planning Organization). (2013). Central Statistical Organization, Total Statistics for 2013, p. 35. [In Persian]
- Need of Smart Villages. (2020). Available online: <https://www.dailyexcelsior.com/need-smart-villages/> (accessed on 14 September).
- Novi, R. N., & Ella, S. (2019). Pengembangan model smart rural untuk pembangunan kawasan perdesaan di Indonesia. *Jurnal Borneo Administrator*, 15(1), 41-58. <https://doi.org/10.24258/jba.v15i1.394>
- Pelucha, M. (2019). Smart Villages and Investments to Public Services and ICT Infrastructure: Case of the Czech Rural Development Program 2007–2013. *European Countryside*, 11(4), 584-598. <https://sciendo.com/article/10.2478/euco-2019-0032>
- Patnaik, S.; Sen, S., & Mahmoud, M.S. (2020). *Smart Village Technology: Concepts and Developments* (Volume 17); Springer Nature: Cham, Switzerland. <https://doi.10.1007/978-3-030-37794-6>

20. Pilot Project (2020). Smart Eco-Social Villages: Final Report; Directorate-General for Agriculture and Rural Development (European Commission), ECORYS, Origin for Sustainability, R.E.D: Brussels, Belgium, April. [https://agriculture.ec.europa.eu/common-project\\_en](https://agriculture.ec.europa.eu/common-project_en)
21. Putnam, R. (1993). *Making Democracy Work: Civic Tradition in Modern Italy*. Princeton University Press. <https://press.princeton.edu/books/paperback/9780691037387/making-democracy-work>
22. Rachmawati, R. (2018). *Pengembangan Smart Village Untuk Penguatan Smart City Dan Smart Regency* (Jurnal Sistem Cerdas vol 01) no. 02 pp. 12–18. <https://DOI:10.37396/jsc.v1i2.9>
23. Rao, N.H. (2007). A framework for implementing information and communication technologies in agricultural development in India. *Journal of Technological Forecasting & Social Change*. <https://DOI:10.1016/j.techfore.2006.02.002>
24. Roumiani, A., Einali, J. & Asari Zamani, A. (2008). The application of information and communication technology (ICT) in strengthening urban-rural relations: A case study of Zanjan city and its surroundings. *Urban Structure and Function Studies*, 5(17), 47-68. [In Persian] <https://DOI:10.22080/SHAHR.1970.2110>
25. Sadeghloo, T., Jafari, F., & Bateqasrabi, H. (2024). Analysis of factors influencing the acceptance of information and communication technology in rural communities: A case study of the villages of Shandiz County. *Village and Development Journal*, 26(1), 1-20. [In Persian] <https://DOI.10.30490/rvt.2022.354648.1361>
26. Slee, B., Hopkins, J., & Vellinga, N. (2015). Could the Creative Class be a factor in Scottish rural development? *Scottish Affairs*, 24(2), 207–226. <https://DOI.10.3366/scot.2015.0067>
27. The European Network for Rural Development (ENRD)-European Commission. (2020), Available online: [https://enrd.ec.europa.eu/smart-and-competitive-rural-areas/smart-villages/smart-villages-portal\\_en](https://enrd.ec.europa.eu/smart-and-competitive-rural-areas/smart-villages/smart-villages-portal_en)
28. Van Gevelt, T., & Holmes, J.A. (2020). Vision for Smart Villages; 2015; Available online: <https://e4sv.org/wp-content/uploads/2015/08/05-Brief.pdf>
29. Visvizi, A., & Lytras, M. D. (2018). It's not a fad: Smart cities and smart villages research in European and global contexts. *Sustainability*, 10(8), 2727. <https://doi.org/10.3390/su10082727>
30. Zavrtnik, V., Podjed, D., Trilar, J., Hlebec, N., Kos, A., & Stojmenova Duh, E. (2020). Sustainable and community-centred development of smart cities and villages. *Sustainability*, 12(10), 3961. <https://doi.org/10.3390/su12103961>



## شناسایی راهبردهای هوشمندسازی روستاها با هدف بهبود کیفیت زندگی

### (مطالعه موردی: شهرستان کلار، استان سلیمانیه، اقلیم کردستان)

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#### چکیده مبسوط

#### ۱. مقدمه

در آسیا تجارب موفق در زمینه هوشمندسازی رخ داده و نتایج به دست آمده از این تجارب، روزنه امیدی است به بهبود زندگی در مناطق روستایی و ترمیم مشکلات به وجود آمده و جلوگیری از بهم ریختگی ساختارهای اجتماعی روستاها و مقابله با پدیده روستاگریزی و به نحوی می‌توان ادعا کرد که با بهبود فناوری اطلاعات و هوشمندسازی روستاها کیفیت زندگی روستاییان بهبود می‌یابد. بکارگیری فناوری‌های نوین برای ساکنین یک حوزه جغرافیایی امریست که در دنیای امروزی به صورت گسترده‌ای با در زندگی روزمره مردمان آمیخته است. در این باره نظر به تعاریفی که در مقدمه بحث اشاره شد دهکده هوشمند و تسهیل در تغییر و ترقی روستاهای با بافت سنتی به روستاهای پیشرفته مقارن با مشخصه‌های تعاریف یک روستای هوشمند امری است که در جوامع امروزه جهانی در بخش تدابیر و اقدامات طرح‌های توسعه روستای در برنامه بیشتر کشورها قرار دارد این پژوهش در صدد پاسخگویی به این سوال کلیدی می باشد که عوامل تاثیرگذار در هوشمندسازی روستاهای شهرستان کلار به چه نسبتی در سطح روستاهای حوزه نمونه‌گیری توزیع و به کارگرفته شده‌اند و با شناسایی سطوح اقدامات هوشمندسازی در سطح روستاها به دنبال ارائه یک برنامه‌ای مناسب بر اساس مطالعات پیشرو خواهیم بود.

#### ۲. مبانی نظری تحقیق

مفهوم "دهکده هوشمند" نیز توسط ون گولت و هولمز کشف شد. آنها با توسعه بخش‌های مختلف مانند بهداشت، آموزش، امنیت غذایی، محیط زیست، کیفیت زندگی چشم انداز بهبود روستا را پیشنهاد کردند (وان جیویلت و هولمز، ۲۰۲۰). توسعه روستایی: دانش و تخصص در امر حکومت (۲۰۱۵) توسط کریستوف ون اشکی

درک درستی از سیاست‌های روستایی در مورد چگونگی اجرای آنها تا آن زمان و کارهایی که می‌توان در آینده انجام داد ارائه می‌دهد. در تحقیقات شهرهای هوشمند و دهکده‌های هوشمند، نویسندگان وایسویزی و لیتراس (۲۰۱۸) با پرداختن به مشکلات سطح جامعه، نمای کلی از موضوعات و جنبه‌های مختلف اقتصادی اجتماعی را برای شهرهای هوشمند و دهکده‌های هوشمند ارائه می‌دهند. آنها با ارائه کتابی ادعا کردند که این کتاب خود شامل مواردی مانند طراحی سیاست، تدوین استراتژی، مطالعات موردی، موضوعات مرتبط با فناوری، ابزارها و سیستم‌های کاربردی است. یکی دیگر از کتابهای آنها، روستاهای هوشمند در اتحادیه اروپا و فراتر از آن، بر اساس واقعیت کاهش جمعیت روستاها، عمدتاً با تمرکز بر روستاهای اتحادیه اروپا ساخته شده است و این مشکل را بررسی می‌کند و یک چارچوب مفهومی برای حل آن با استفاده از ICT فراهم می‌کند.

#### ۳. روش تحقیق

جامعه آماری پژوهش، چهار دهستان شهرستان کلار بود که از هر دهستان سه روستا به صورت تصادفی ساده انتخاب و در مجموع با بکارگیری فرمول کوکران با خطای ۵ درصد از مجموع ۲۶۲ خانوار این محدوده ۱۵۰ نمونه در جهت جمع آوری اطلاعات تهیه گردید و با بررسی روایی پرسشنامه و به کمک آلفای کرونباخ به دست آمده پایایی پرسشنامه نیز تأیید گردید.

#### ۴. یافته‌های تحقیق

یافته‌ها نشان می‌دهند که در وضعیت زیرساخت‌های موجود برای هوشمندسازی در روستاهای شهرستان کلار تنها منحصر به توسعه شبکه تلفن همراه بوده است و زیرساخت‌های دیگر فناوری اطلاعات و ارتباطات اعم از امنیت شبکه، تجارت الکترونیک و کارآفرینی ضعیف است. در عین حال سطح دانش و اطلاعات مردم بومی برای

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هوشمندسازی روستاها به صورت کارآمد بر کیفیت زندگی مردم بومی آنچنان که باید تأثیرگذار نبوده و هنوز توسعه فناوری اطلاعات و ارتباطات نیاز به زمان و سرمایه گذاری فراوان دارد. فناوری اطلاعات و هوشمند سازی تنها منحصر به استفاده از گوشی های هوشمند است و دیگر زیرساخت های فناوری اطلاعات رشد چندانی نکرده است.

#### تشکر و قدردانی

پژوهش حاضر برگرفته از پایان نامه کارشناسی ارشد نویسنده اول (هاویش غفور سعید)، گروه جغرافیا دانشگاه رازی، کرمانشاه، ایران است.

**کلید واژه ها:** هوشمندسازی، دهکده هوشمند، استراتژی در ICT، توسعه روستایی، شهرستان کلار.

هوشمندسازی در روستاهای شهرستان کلار مناسب است اما تاثیرات هوشمندسازی روستاها بر کیفیت زندگی مردم در روستاهای شهرستان کلار محدود بوده است و فناوری اطلاعات و ارتباطات بیشتر جنبه تفریحی و تفننی دارد. در این زمینه توسعه زیرساخت ها و سمن ها و ایجاد دولت الکترونیک از اهمیت زیادی برخوردار است. همچنین توسعه آموزش الکترونیک و پزشکی از راه دور نقش مهمی در توسعه فناوری اطلاعات دارد.

#### ۵. بحث و نتیجه گیری

نتایج این تحقیق نشان داد که زیرساختهای موجود برای هوشمندسازی در روستاهای شهرستان کلار در وضعیت نامناسبی است و سطح دانش و اطلاعات مردم بومی برای هوشمندسازی در روستاهای شهرستان کلار در وضعیت نامناسبی بوده و متأسفانه

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