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The role of smart cities in supporting smart tourism

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دور المدن الذكية في دعم السياحة الذكية

الملخص :

يهدف البحث إلى مناقشة احتياجات ومتطلبات السائحين المحليين في المدن الذكية في مصر بناءً على تلك الاحتياجات والمتطلبات ، والتي ستؤثر بشكل إيجابي على الخدمات السياحية المقدمة في تلك المدن. اعتمدت هذه الدراسة على نهج كمي. استخدم هذا البحث PLS-SEM بمساعدة Smart PLS 3.2.8. تنقسم الدراسة إلى قسمين: الدراسة النظرية لأهم ركائز المدن الذكية بشكل عام حتى نتمكن من استكمال الجزء الثاني من الدراسة وهو الجانب العملي من البحث ، حيث تم توزيع استبيان على 314 فردًا من المجتمع المحلي لدراسة احتياجات الأفراد من الخدمات المختلفة في المدن الذكية في مصر والنشاط السياحي بشكل خاص ، وكذلك التعرف على أهم التحديات التي تواجه تحقيق ذلك. توصلت النتائج وجود علاقة ذات دلالة إيجابية بين الحكومة الإلكترونية والسياحة الذكية بالمثل ، مما يدل على وجود علاقة إيجابية مهمة بين الاقتصاد الذكي والسياحة الذكية. أيضا علاقة إيجابية بين البيئة الذكية والسياحة الذكية.

الكلمات المفتاحية : مدن ذكية ، سياحة ذكية

Abstract:

The research aims to discuss the needs and requirements of local tourists in smart cities in Egypt based on those needs and requirements, which will positively affect the tourism services provided in those cities. This study relied on a quantitative approach. This research used PLS-SEM with the assistance of Smart PLS 3.2.8. the study is divided into two parts: the theoretical study of the most important pillars of smart cities in general so that we can complete the second part of the study, which is the practical side of the research, where a questionnaire was distributed to 314 individuals from the local community to study the needs of

individuals for various services in smart cities in Egypt and tourism activity in particular, as well as identify the most important challenges facing achieving this. The research result a positively significant relationship between E government and smart tourism similarly positing a positively significant relationship between Smart Economy and Smart Tourism. Also a positive relationship between smart environment and smart tourism.

Keywords: Smart cities, Smart tourism

Introduction:

The word "smart" has become the latest word to describe technological, economic, and social developments fuelled by advancements in technology (Koo et al., 2015). Almost everything is becoming smart. People use smartphones, build smart buildings, and reside in smart homes with smart TVs and smart fridges (Gajdošík, 2018). Making a city "smart" is a strategy to alleviate the problems created by urban population growth and rapid urbanisation (Chourabi et al., 2012). This fast-paced transition to a highly urbanised population creates many challenges for the planning, development, and operation of cities that are invigorating new thinking in the responsible professions—architects, urban planners and designers, transportation engineers, utilities, social scientists, environmental scientists, public finance and policy, municipal government, and, most recently, information technology (Harrison and Donnelly, 2011).

The smart city implements the "Internet of Things" (IoT) notion. The endless growth of population and urbanisation has escalated the need for innovative ways to handle urbanisation with minimal effect on the environment, citizen lifestyles, and governance. The initial incorporation of information and communication technology (ICT) into city operations has advanced telecity (Silva et al., 2018).

A parallel concept surfaced in tourism—the smart tourism destination. In a similar vein to smart cities, the concept of smart tourism destinations has developed over time from an initial focus on technology to better tourists' and visitors' experiences (Stefaniak, 2021).

Literature Review:

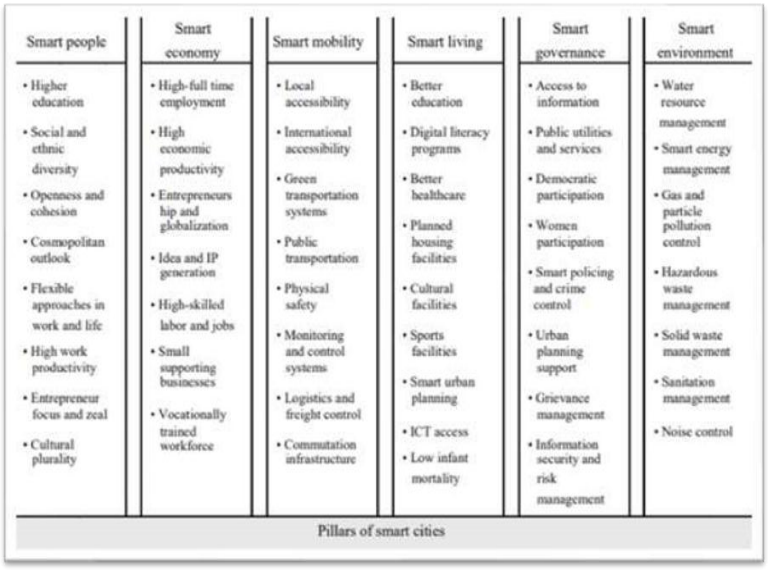
Smart Cities:

The definitions and ideas of smart cities are still evolving, and there is currently no clear and distinct definition of a smart city among the different stakeholders. In order to apply and evaluate smart cities in practice, a deeper understanding of the "smart city" still needs to be defined (Yin et al., 2015). One of the first definitions proposed by Harrison et al. (2010) describes a smart city as an instrumented, interconnected, and intelligent city. This definition highlights the connection between the physical, ICT, social, and business structures of a city (Yin et al., 2015).

One of the prominent definitions is the one provided by Giffinger et al. (2007); who defined a smart city as "a city well performing in a forward-looking way in economy, people, governance, mobility, environment, and living, built

on the smart combination of endowments and activities of self-decisive, independent, and aware citizens" (Kusumastuti et al., 2022). As the term "smart city" is gaining popularity, there is still confusion about the aspects of smart cities (Jasrotia and Gangotia, 2018). One of the existing frameworks, perhaps the most known one, is the EU's smart city wheel. According to this wheel, smart cities can be identified as having a smart economy (e.g., productivity), smart people (e.g., a community with high social and human assets), smart governance (e.g., good governance and policy), smart mobility (e.g., transport and technology accessibility), a smart environment (e.g., sustainability), and smart living (e.g., liveability and well-being) (Yigitcanlar et al., 2018). An observation of academic literature highlights that there are six important elements of smart cities that have been typically observed, namely: smart economy, smart people, smart governance, smart mobility, smart environment, and smart living, as following Figure.

Figure 1. The Six Dimensions (Pillars) of Smart Cities



Source: (Kar et al., 2017).

All of these dimensions' act as pillars that compose the foundation of smart cities. Thus, it can be stated that a smart city is a sustainable, habitable, interlinked, and intelligent city (Jasrotia and Gangotia, 2018). As a result, Caragliu et al. (2011) concluded that cities can be classified as smart when they achieve sustainable economic growth and a high quality of life through investments in human capital, a respectable level of government participation, and the presence of a structure that facilitates proper information dissemination throughout the city. Overall, a smart city can be perceived as an "organic whole" and as a

connected system where people, visitors, and citizens alike are the most significant aspects (Boes et al., 2015).

Smart Governance: A smart city will be able to grow and sustain itself only if the focus is on developing strategies and policies for smart governance. It is not only about making the right strategic and policy choices but also about applying those strategies and policies. Acquiring public information should be made simple for the general public. This should not violate privacy or safety, nor should it pose a danger of misuse of the information assets, for which possibilities may be created when all of the key operations and entities are digitized. Electronic governance and its maturity would play a fundamental role in such a smart city. In such cities, public involvement in democracy and lawmaking would be expected. For example, in India, platforms such as MyGov enable a citizen's involvement in public policy and urban governance. As per Lombardi et al. (2012), smart governance may be permitted for a citizen through the use of e-governance. Sharing of information, straightforward decision-making, and stakeholders' participation in enhancing government services would play an important role in achieving smarter governance. Lee et al. (2014) emphasize that public–private partnerships and citizen involvement are important components of smart city governance.

H1: E Government has a significantly positive influence on Smart Tourism.

Smart Living: The literature calls attention to the indicators of smart living that may be considered within

smart cities when there are areas for entertainment use: (ex: cinemas, sports fields, public libraries, etc.). People need to be exposed to business training and international ideals while developing such infrastructure.

Various cultural establishments for different religions and ethnicities should be made available, whether they belong to minor or major communities. Campuses for both primary and secondary education should be prioritized. The further development of world-class universities focusing on knowledge creation and distribution should also be highly prioritized. Additionally, a city should have world-class hospitals with state-of-the-art treatment facilities and equipment. Cities should have arrangements for good-quality housing and a related supporting ecosystem so that citizens can positively influence their city's development.

H2: Smart Living has a significantly positive influence on Smart Tourism**.**

Smart Mobility: A smart city would need smart mobility systems and a framework to deal with the needs of the local communities. In this context, a smart mobility simulation analysis may help legislators formulate a plan for smart cities in a better way. Smart mobility requirements would also include the city's availability on a national and international scale. It would also be important to make sure that ICTs have been widely used during the development and management of accompanying infrastructure, such as bridges, national highways, monorails, and metros. Intelligent transportation systems should provide last-mile connectivity for both citizens and organizations. Transportation systems should take care of the daily and

uncommon commuters, as well as operational needs within and outside the city.

H3: Smart Mobility has a significantly positive influence on Smart Tourism**.**

Smart Economy: It may be proposed that a smart economy can be attained by securing investment, jobs, businesses, and talents. According to Lombardi et al. (2012), focus areas for a smart economy could be indicators such as public expenditures on education, research grants, research and development (R&D), and the percentage of gross domestic product (GDP) per head of city population. A smart economy is driven by innovation and is expected to be backed by world-class universities, creating an ecosystem to feed the entrepreneurial essence of society's citizens. The economy should project an economic image globally and have a trademark as well. Productivity and an adaptable labor market should be provided by the city administrative authority. The economy should have international branding as well as be highly varied.

H4: Smart Economy has a significantly positive influence on Smart Tourism.

Smart People: This viewpoint highlights the focus on concerns surrounding people'seducation, learning, creativity, and involvement in public life as some of the critical indicators for utilizing the human potential of a smart city. In order to make the local communities of such settlements smart, quality of life and personality should be consistently improved. One of the most important attributes is the involvement of graduate students in higher education and the highest level of qualification, which could lead to

knowledge-driven jobs and sophisticated property creation. Such intelligent people should be eager to learn lifelong skills and have high social and ethnic diversity.

Open-mindedness is also one of the expected qualities of people living in smart cities. Flexibility to adapt to environmental changes and ample creativity to add to the knowledge economy would be of foremost importance. Such smart people would also be expected to possess a democratic disposition and engage in public life as well.

H5: Smart People has a significantly positive influence on Smart Tourism

Smart Environment: A smart city should have a high focus on sustainability in the environment. Smart energy management strategies may be endorsed, such as the conversion of natural light for use in established buildings, homes, hotels, and so on. Since carbon emissions and other pollutants influence the environment of a city, low-carbon coordination networks should be used to minimize the carbon footprint. According to Lombardi et al. (2012), smart environment regulation encompasses the management of green gas emissions, reaching high-energy efficiency, the preservation of electricity, the treatment and conservation of water resources, and the management of green spaces. An all-inclusive policy would be needed to refine and track environmental performance and air pollution. For securing and preserving a smart environment, focused strategies need to be implemented to keep track of the carbon footprint and save natural resources such as water, greenery, and air (Kar et al., 2017).

H6: Smart Environment has a significantly positive influence on Smart Tourism

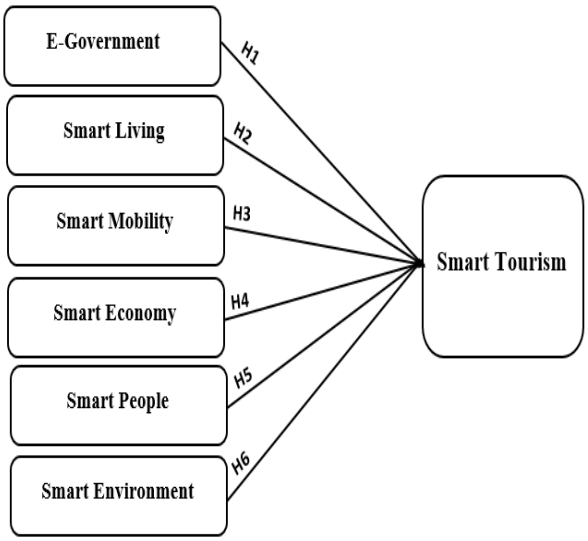


Figure 2. Conceptual Model

Methodology:

The research was based on a quantitative approach. This research used PLS-SEM with the assistance of Smart PLS 3.2.8. The rationale for picking this approach was that it assisted in assessing complicated models with a simple procedure. the current study is divided into two parts: the theoretical study of the most important pillars of smart cities in general so that we can complete the second part of the study, which is the practical side of the research, where a questionnaire was distributed to 314 individuals from the local community to study the needs of individuals for various services in smart cities in Egypt and tourism activity in particular, as well as identify the most important challenges facing achieving this.

Scale development

A questionnaire with a multi-item approach was utilized to gather data. Due to content validity concerns about the data, items were derived from the literature. For the purpose of enhancing reliability and validity, several items were used to evaluate each dimension. The questionnaire was divided into seven main parts. The first part was a brief explanation of e-government, which included three items taken from previously published research. The second part reflects the Smart Living construct, which consists of six items modified from existing literature. The third part discussed smart mobility, which included four items from a prior survey. While The fourth part was focused on smart economies which included two items extracted from previously published studies. The fifth section explained

the smart people construct, which is based on three key items from previous literature. The sixth part was focused on smart environments which included five items taken from previously published research. Finally, the seventh part was a brief explanation of smart tourism, which included five items from a prior study. Using the PLS algorithm approach, the results of construct validity and convergent validity are shown in table 1 & 2 and figure 3, respectively.

Table 1. shows Standardized Loadings for Each Items

Variables	Code	Items	Factors loading	Results	Sources
Smart Cities					
E-Government	**SG1**	Providing electronic services (such as the use of social media) to involve the local population in decision-making processes (social participation).	0.855	**Accept**	
	SG2	Providing databases to serve all citizens without any discrimination (smart dealing with government	0.813	**Accept**	

		institutions).			
	SG3	Develop a central database that provides the necessary information about citizens.	0.801	**Accept**	
Smart Living	**SL4**	Availability of Wi-Fi networks in the streets and made available to all citizens for free.	0.641	**Delete**	
	SL5	Establishment of housing schemes equipped with all civil facilities in order to provide a more comfortable and luxurious life for citizens.	0.715	**Accept**	
	SL6	Development of electronic transactions (especially e-payments).	0.810	**Accept**	
	SL7	Improving infrastructure (roads, water and sewage	0.776	**Accept**	

		networks,...).			
	SL8	Introducing new systems to enable citizens to easily access health care (such as: monitoring remote patients, providing ambulance services, blood banks and pharmacies in the vicinity); to help patients faster and more efficiently.	0.813	**Accept**	
	SL9	Providing remote-learning service to all citizens.	0.609	**Delete**	
Smart Mobility	**SM**10	Providing the streets with lighting poles that collect information about congested traffic places.	0.782	**Accept**	
	SM11	Introducing transportation systems	0.818	**Accept**	

		(metaphor devices) to manage traffic congestion and maintain the element of safety and security and the possibility of finding vacant parking spaces (parking).			
	SM12	The adoption of electronic transportation means that helps reduce traffic congestion and reduce CO2 emissions.	0.754	**Accept**	
	SM13	Providing cities with smart applications that help individuals reach all places easily.	0.831	**Accept**	
Smart Economy	**SE**14	Public spending on research and development (R&D).	0.660	**Delete**	

	SE15	Creating jobs for skilled people in the technology and creative industries at higher wage rates in smart cities.	0.876	**Accept**	
Smart People	**SP**16	Attention to the quality of education since the basic education stage.	0.635	**Delete**	
	SP17	Providing programs and training courses for citizens in order to improve their professional capabilities.	0.843	**Accept**	
	SP18	Providing opportunities and incentives to enhance the creative, innovative, and intellectual capabilities of citizens.	0.875	**Accept**	
Smart Environment	**SEN**19	(Energy efficiency) Reducing the	0.813	**Accept**	

		use of non-renewable energy that pollutes the environment to its lowest levels and increasing reliance on renewable energy (such as: solar energy, wind energy, etc.).			
	SEN20	Creating systems that will conserve natural water resources; To ensure its sustainability and reduce wasteful use of water.	0.787	**Accept**	
	SEN21	Waste water recycling	0.810	**Accept**	
	SEN22	Involve local people in environmental activities.	0.744	**Accept**	
	SEN23	Encouraging companies to adopt ISO 14000, 14001 standards (related to reducing their negative	0.664	**Delete**	

		impacts on the environment and complying with environmental laws).			
Smart Tourism					
Informativeness	**ST24**	Smart tourism technology provides tourists with useful information about tourist destinations and trips.	0.844	**Accept**	
Accessibility	**ST25**	Smart tourism technology can be used easily anytime and anywhere.	0.812	**Accept**	
Interactivity	**ST26**	Smart tourism technology is responsive and it is easy to share tourism information about this technology.	0.889	**Accept**	
Personalization	**ST27**	Smart tourism technology provides information that meets the	0.807	**Accept**	

		needs of tourists and matches their personal preferences.			
Security	**ST28**	Smart tourism technology protects the privacy of tourists.	0.556	**Delete**	

According to the findings of the measurement model, E-government has three indicators loaded in the analysis with loadings of 0.855 (SG1), 0.813 (SG2), and 0.801 (SG3), with a reliability of 86.3 percent and an AVE of 0.678. While Smart Living has a total of six indicators, two (SL4, SL9) were deleted due to being less than the allowed (0.641, 0.609), 0.715 (SL5), 0.810 (SL6), 0.776 (SL7), and 0.813 (SL8) with the internal consistency of 88.7 percent and AVE of 0.663.

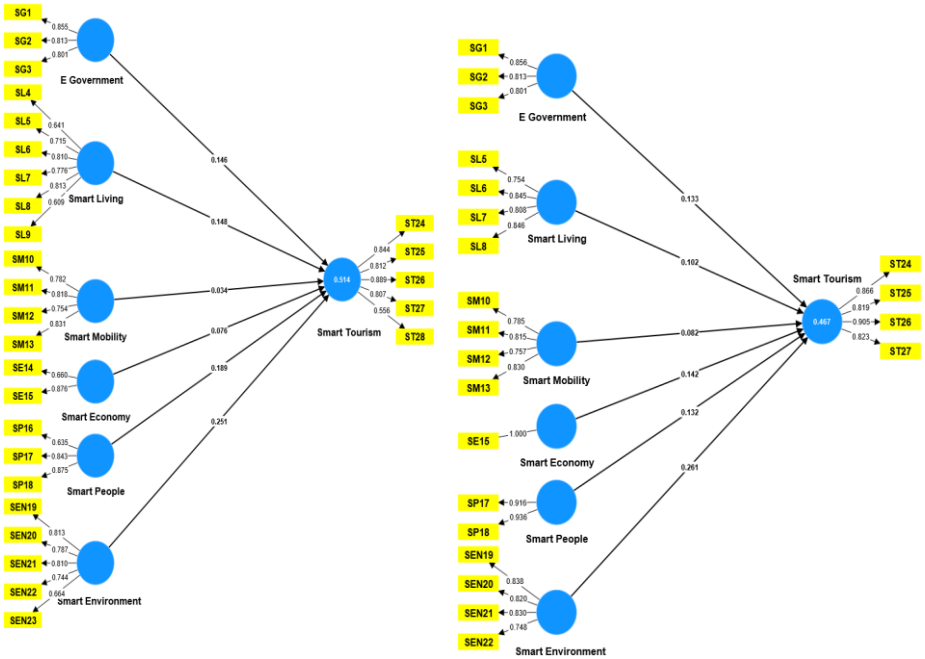


Figure 3. PLS Path Coefficient Algorithm

Similarly, the Smart Mobility indicator has four loadings: 0.782 (SM10), 0.818 (SM11), 0.754 (SM12), and 0.831 (SM13), with CR of 0.874 and AVE of 0.635. Moreover, Smart Economy has a total of two indicators; one of them was deleted at 0.660 (SE14), while another was accepted at 0.876 (SE15), with a composite reliability of 100 percent and an AVE of 0.1.

Table 2. Reliability and Validity of Measurement Scales

Constructs	Alpha (α)	Rho	CR	AVE
E-Government	**0.763**	**0.766**	**0.863**	**0.678**
Smart Living	**0.830**	**0.839**	**0.887**	**0.663**
Smart Mobility	**0.809**	**0.813**	**0.874**	**0.635**
Smart Economy	**0.100**	**0.100**	**0.100**	**0.100**
Smart People	**0.834**	**0.844**	**0.923**	**0.857**
Smart Environment	**0.825**	**0.825**	**0.884**	**0.656**
Smart Tourism	**0.876**	**0.888**	**0.915**	**0.729**

Smart People has three indicators: the first (SP16) with 0.635 loadings has been deleted, while indicators (SP17) and (SP18) with 0.843 and 0.875 loadings have been accepted, with a reliability of 92.3 percent and an AVE of 0.857. Smart Environment has a total of five indicators with loadings of 0.813 (SEN19), 0.787 (SEN20), 0.810 (SEN21), and 0.744 (SEN22), while 0.664 (SEN23) has been deleted. The internal consistency of this construct was 88.4 percent with an AVE of 0.656.

Lastly, smart tourism has five indicators with factor loadings of 0.844 (ST24), 0.812 (ST25), 0.889 (ST26), and 0.807 (ST27), while the last indicator, 0.556 (ST28), was deleted. The internal consistency of this construct was 91.5 percent with an AVE of 0.729. As suggested by Hair et al. (2011), the estimates of the measurement model revealed that the majority of indicators had factor loadings more than 0.60, CR greater than 0.70, and AVE of 0.50.

Table 3. Discriminant Validity Fornell–Larcker Criterion

	(EG)	(SE)	(SEN)	(SL)	(SM)	(SP)	(ST)
E Government (EG)							
Smart Economy (SE)	**0.710**						
Smart Environment (SEN)	0.747	**0.558**					
Smart Living (SL)	0.769	0.498	**0.641**				
Smart Mobility (SM)	0.758	0.472	0.647	**0.812**			
Smart People (SP)	0.600	0.417	0.802	0.542	**0.657**		
Smart Tourism (ST)	0.668	0.522	0.707	0.582	0.586	**0.620**	

The previous table shows that all of the AVE squared-root coefficients of latent constructs displayed in diagonally bold values were found to be greater than other constructs in the model, indicating that the current study attained discriminant validity using the Fornell and Larcker (1981) criteria.

The results of path analysis using PLS bootstrapping at 5000 subsamples and a 95 percent confidence interval for hypothesis testing are shown in table 4 and figure 4.

Table .4 Path Coefficient and Hypotheses Testing

No.	Relationship	β values	P values	t-Values	Decision
H1	E Government -> Smart Tourism	0.133	0.041	2.042	Accepted
H2	Smart Living -> Smart Tourism	0.102	0.105	1.622	Rejected
H3	Smart Mobility -> Smart Tourism	0.082	0.178	1.347	Rejected
H4	Smart Economy -> Smart Tourism	0.142	0.019	2.338	Accepted
H5	Smart People -> Smart Tourism	0.132	0.108	1.606	Rejected
H6	Smart Environment -> Smart Tourism	0.261	0.001	3.323	Accepted

The previous table illustrates that the first hypothesis (H1), which postulates a positively significant relationship between E government ($\beta = 0.133$, $p < 0.05$) and smart tourism, has been accepted at 5% statistical significance. Similarly, the fourth hypothesis (H4) positing a positively significant relationship between Smart Economy ($\beta = 0.142$, $p < 0.05$) and Smart Tourism has been accepted at a significance level of 5%. The sixth hypothesis (H6), which proposes a positive relationship between smart environment ($\beta= 0.261$, $p < 0.01$) and smart tourism, has also been accepted.

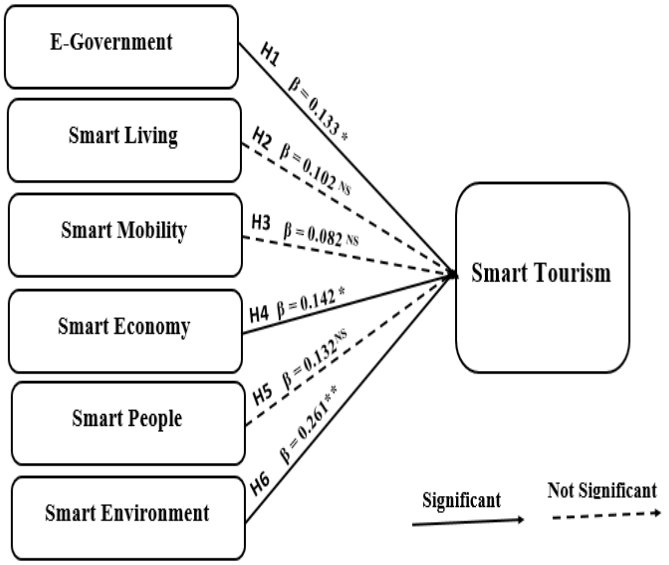


Figure 4. Empirical Framework

While second hypothesis (H2) has no a positively significant association between smart living and smart tourism (β= 0.102, p □ 0.05) has been rejected. The third hypothesis (H3) has no a positive relationship between smart mobility (β= 0.082, p □ 0.05) and smart tourism, therefore, (H3) has been rejected. lastly, fifth hypothesis (H5) has no a positively significant relationship between smart people (β = 0.132, p □ 0.05) and smart tourism. Hence, H5 has been rejected.

6. Conclusion:

The research indicates the needs of the local community in Egypt to various electronic services and their desire for the

development of various databases that provide more information and data on various tourism services and various tourist destinations, as well as the connotation of their tourism thought with more development, innovation, development and provision More job opportunities and training of various human resources in all technological and creative industries that serve the tourism sector in Egypt.

It is also advisable to increase the local community's need to use energy efficiently (especially in various tourism services and tourist facilities, as well as in the development of tourism infrastructure) in a way that preserves natural resources in various tourist cities, as well as their need to involve the local population in all activities aimed at preserving Environment, in cooperation with various tourism institutions and organizations.

With the conclusion of the research, it is necessary to study the degree of awareness of the local community in Egypt in some other key areas related to the concept of smart cities, such as smart living, smart mobility, and smart people, to show the degree of their need for those services that greatly affect the overall services provided by smart cities that serve in some ways smart tourism, which can be studied in detail in future research.

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