The Role of Skyscrapers in Promoting Tourism in Cities Along the Persian Gulf

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Abstract

This research aims to investigate the role of skyscrapers in promoting tourism in cities located along the Persian Gulf. Since constructing tall buildings is considered a way to achieve worldwide fame and thus attract tourists in the Middle East region, this research examined the role of this policy in the long term.

The research is quantitative and employs a correlational research method. The variables and indexes affecting the number of international tourists have been extracted from reviewing the theoretical foundations and literature. To validate the conceptual model, time series regression analysis was conducted (by using the ARIMA model in Stata and Minitab software). The impact of skyscrapers has been investigated along with four other effective indexes in attracting international tourists.

Among the 100 tallest cities in the world which host the greatest number of over 100-meter skyscrapers, five cities along the Persian Gulf were chosen to study (Dubai, Abu Dhabi, Doha, Kuwait City, and Manama). A significant correlation between the number of skyscrapers and the number of tourists has been observed, only in one (Kuwait City) out of five cities.

The study concluded that the policy of constructing skyscrapers has been much less effective than the four other indexes to promote international tourism. Government spending, foreign direct investment, political stability, and social freedom and civil rights have been the most effective factors, respectively.

Keywords: Skyscrapers, Tourist, Middle East, ARIMA, Time series regression.

Introduction

In the last three decades and after the beginning of the 21st century, in particular, the construction of skyscrapers has gained significant momentum in the world and especially in Asia. As the statistics indicate, the popularity of skyscrapers in Asia has risen in such a way that after about 20 years of the current century, buildings with a height of more than 100 meters have been constructed 12 times more than 20th century. Nowadays, Asian cities have hosted more than 80% of the skyscrapers in the world (Al-Kodmany, 2020a). What is considered as another important point is that the construction of skyscrapers is not the same all over Asia. Most of these tall buildings are constructed in countries which are located either in East Asia such as China, Japan, South Korea, and Malaysia, or in the Middle East, especially along the Persian Gulf, like the United Arab Emirates, Qatar, Bahrain, and Kuwait. Regarding the current

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trend of constructing skyscrapers in Asia, researchers define specific reasons which are derived mostly from the economic growth in particular Asian countries. However, regarding the cities along the Persian Gulf, many researchers, in addition to economic growth, introduce another important reason which is the effort to become more famous to attract more and more international tourists. This is considered a significant factor and an effective stimulation that has influenced the construction of skyscrapers in this specific region of the world (Ong, 2011; Ponzini, 2011; Al-kodmany, 2012; Sharaf, 2022). Considering this issue, the important question would be, to what extent has the policy of constructing tall buildings been effective in attracting international tourists to the cities along the Persian Gulf?

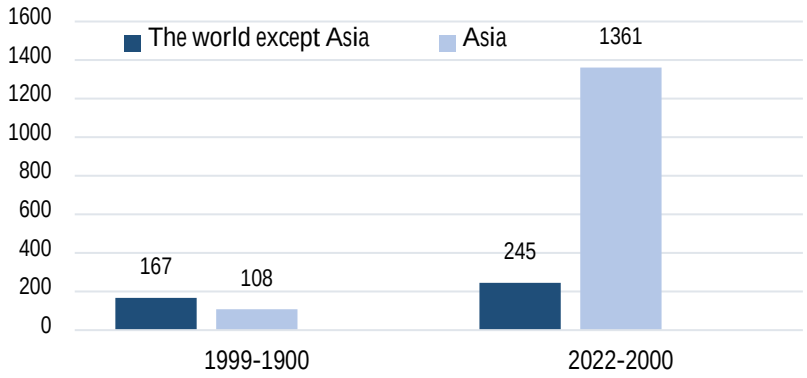

Fig. 1: Comparison of the number of skyscrapers with a height of more than 100 meters in the 20th and 21st centuries
Source: Wood & Safarik, 2019; Al-Kodmany, 2020a

Literature Review

Various studies have investigated the definition, origins, reasons, goals, and consequences of building skyscrapers in the world and Asian cities. Begeç and Hamidabad (2015) by comparing different studies conclude that the definition of skyscrapers has changed over time but today, tall buildings with a height of more than 100 meters are known as skyscrapers. Some researchers write about the origins of skyscrapers in the United States. For instance, Domosh (1998) points out that the construction of these buildings started in the 19th century in North America. Ahlfeldt & Barr (2020) agree with her and add that these buildings aimed to increase the density and quantity of flats and offices in cities like New York and Chicago. According to Moon, today Asia hosts these types of buildings more than any other place in the world. China in East Asia and the United Arab Emirates in the Middle East have been the pioneers in constructing skyscrapers in Asia in the last two decades (Moon, 2015). Agreeing with him, Al-kodmany (2020b) writes about the trend of constructing skyscrapers in Asia and points out that more than 1500 skyscrapers have been constructed in Asia in the 21st century.

Ren (2008) presents one of the main reasons for the popularity of this trend in Asia. According to him, in Asian countries, the government plans directly or indirectly (by encouraging the private sector) to construct skyscrapers to build a noteworthy reputation for the country and to promote city branding and tourism. In this regard, Ford (2021) writes that one of the prominent solutions of the Middle-East countries in order to achieve this goal is to have famous western architects design Asian super projects. This trend can guarantee the building of well-reputed projects for the cities. A controversial study in this regard points out that as foreign famous architects are not being selected based on a democratic process in Middle-East countries, sometimes the relationship between the context and the tall buildings is totally ignored (Ponzini, 2011).

Ong (2011) writes about another reason for the popularity of constructing skyscrapers in Asia. She considers these buildings as a mean to show the power and efficiency of the mostly non-democratic governments of Middle-East countries, also this policy makes these countries

more famous which lead to promote tourism. In addition, Jones (2009) points out that the competition between Asian cities can be known as another effective factor for constructing tall buildings. He says that Asian countries located in the Middle-East are competing with each other in order to attract more tourists and skyscrapers. Thus, megaprojects facilitate the steps of achievement this goal.

Researchers have also focused on the visual impact of tall buildings on the audience and tourists. In this regard, Yan and Santos (2009) say that in modern cities, especially in Asia, tall buildings have the most important impact on the skyline and visual effects of the city which can lead to tourist attraction. This argument has similarities with those of Sklair who points out that today, cities have been designed in order to satisfy tourists who are fascinated by the silhouette of these tall buildings (2010). Puspitasari et al. (2020) consider a similar purpose for these buildings as they point out that skyscrapers are expected to create merely an eye-catching background for the tourists' photos. Thus, the construction of iconic tall buildings has become popular in Asian cities, especially along the Persian Gulf.

Some researchers believe this trend would bring some negative effects. Xu and Yeh (2005) say that although these projects generate wealth for the city, they further increase class differences and unfair distribution of wealth among citizens in long term. Koolhaas (2002) adds that the urban spaces resulting from superstructures are not always efficient. These spaces cause the loss of distinction between cities, make every city look alike and confuse the audience. Lui (2008) considers similar consequences for this trend as he points out that the competition between cities to build super projects makes these cities become more and more similar to each other rather than creating a distinction in urban space.

Previous studies can be divided into four categories. Some have studied the origin of tall buildings in the United States and the current trend of building skyscrapers in Asian cities (Domosh, 1998; Ahlfeldt & Barr, 2020) Some others focus on the reasons for this trend in Asia and Middle-East countries. These studies point out that city branding and competition between countries to be more attractive to tourists are the main reasons for constructing lots of skyscrapers in Asian cities (Ren, 2008; Jones, 2009; Sklair, 2010; Ong, 2011). Another group studied the visual aspects of skyscrapers and their effects on attracting tourists (Yan & Santosh, 2009; Puspitasari et al., 2020). The last group of studies argue about the consequences of the current trend of constructing skyscrapers in Asian cities (Koolhaas, 2002; Yu & Yeh, 2005; Lui, 2008). Considering these studies, although many researchers point out the effects of skyscrapers on promoting tourism, none investigates this argument in practice through statistics. The objective of this research is to investigate the long-term efficiency of tall buildings in attracting foreign tourists in cities located in the Middle-East along the Persian Gulf.

Theoretical Foundations

It is obvious that in addition to skyscrapers, there are other significant ways to attract international tourists, and extensive research has been done to notice the factors affecting this field. Many suggest that political stability and security are prerequisites for tourism. Events such as civil disturbances, political unrests, and terrorism contribute to deter the tourists' choice of a destination (Hai & Chik, 2011; Ingram et al., 2013; Haddad et al., 2015). The impact of political instability on destinations that tourists choose is both immediate and long-term. The countries affected by political unrest face inevitably a decline in international tourist arrivals and tourism revenues (Saha, & Yap, 2015; Ünzüle & Kiliç, 2018; Adeola et al., 2020; Ghahremani et al., 2021). According to some research, individual and social freedom, as well as civil rights are known as another effective index which plays an important role in promoting tourism (Cole & Eriksson, 2010; Altin et al., 2015; Demir & Gozgor, 2019).

Researchers say that civil rights and social freedom have a significant impact on the formation of tourists' mental image of the host countries, which will ultimately lead to tourists' willingness or unwillingness to travel to those countries (Altin et al., 2015; Demir & Gozgor, 2019; Pérez-Tapia et al., 2021). On the other hand, some studies show that the development of civil infrastructure, city services, recreational facilities, and amenities have a significant impact

on attracting local and foreign tourists (Awaritefe, 2004; Mahdi & Esztergár-Kiss, 2022). Factors such as, transportation network, roads, restaurants, public parking lots, entertainment and welfare facilities, and quantity and quality of hotels and accommodations are among the most prominent components in attracting tourists (Leisen, 2001; Firoiu & Croitoru, 2013; Seyidov & Adomaitiene, 2016). But the development and expansion of these facilities and infrastructures require remarkable investment.

This investment is generally achieved through two paths that are intertwined and related to each other. The first path is government investment in infrastructure, which is known as "Government Spending" and causes the expansion of the country's infrastructure such as the acquisition of goods and provision of services such as education, healthcare, social protection, and defense which consequently lead to expansion of foreign investment as well as the growth of the tourism industry (Lubov et al., 2016; Jovanova & Ivana, 2016; Mandic et al., 2018; Petrova & et al., 2018). The other path is foreign direct investment which can lead to the development of the country and improvement of civil infrastructure and the investment climate in the economy. This index is known as Foreign Direct Investment Net Inflow (FDI) and is considered an important factor regarding the tourism industry (Subbarao, 2008; Samimi et al., 2013; Kaur, 2019; Adeola et al., 2020; Nguea, 2020).

There are five variables: the number of skyscrapers, political stability, foreign direct investment net inflow, government investment, and social freedom and civil rights are considered as independent and effective factors in attracting international tourists. The variables, their definitions, measurement units, and data collection sources are represented in the following table in detail.

Table 1: Variables specification
Source: Authors

Variable	Abbr.	Definition	Measurement	Data source
The number of skyscrapers	Bcount	The total number of tall buildings with a height of more than 100 meters	Natural numbers	Al-Kodmany, 2020a; Wood & Safarik, 2019; Skyscrapercenter,2022
Political stability	Pstblt	The possibility of the government being destabilized or overthrown by illegal or violent means, including political violence and terrorism	to -2.5 (2.5+ is 2.5+ the most stable and -5.2 is the most unstable)	The global economy
Social freedom and civil rights	SCfrdm	The performance of the country in the field of freedom of speech and opinion, social rights, rule of law and human rights, individual freedoms and rights, and the independence of the judiciary	0 to 100 (0 is the most unfree and 100 is the freest situation)	(House, 1996-2020) Freedom in the World 1996-2020
Government spending	GS	It refers to the amount of money that the public sector spends to acquire goods and provide services such as education, health care, and providing infrastructure	0 to 100 (100 is the highest investment ratio and 0 is the lowest investment ratio)	World Bank
Foreign direct investment	FDI	It is the value of direct investment made by non-resident (foreign) investors in the economy	FDI inflow; the current rate of the US dollar (millions of dollars)	World Bank
Tourist index	Trstl	The number of foreign tourists entering the city in proportion to the total number of international tourists in the world in the same year	In terms of percentage	World Bank The global economy

Research Method

This research employs correlational criteria and indexes related to attracting international tourists extracted based on the theoretical foundations and a documentary survey using library sources and references books and articles. This research is quantitative, and to validate the conceptual model, time series regression analysis was conducted by using the ARIMA model. Five leading cities having skyscrapers (Dubai, Doha, Abu Dhabi, Kuwait City, and Manama) have been studied. All of them are located along the Persian Gulf and are among the 100 tallest cities in the world in terms of the number of tall buildings by the height of over 100 meters (Wood & Safarik, 2019; Al-Kodmany, 2020a).

In order to analyze time series regression Stata and Mini Tab software have been used and the role of 5 defined variables in attracting foreign tourists was investigated for each of the cities. The time origin of the data for the different cities is considered from the beginning of the period when the construction of skyscrapers in these cities has grown significantly (for Dubai since 1995 and other cities since the beginning of the 21st century). Considering the covid-19 pandemic in 2020 and its consequences such as travel restrictions which caused a sharp decrease in the number of international tourists, the time period of the survey is until the end of 2019. Finally, after performing time series regression, the role of skyscrapers and other effective factors in increasing the number of tourists has been analyzed.

Research Findings

In order to analyze time series regression, multi-collinearity and the correlation between the variables have been checked, as it is clear in table 2, the degree of multicollinearity between the variables is desirable (the multicollinearity index which is known as VIF is less than 10, and the variables are not correlated with each other). Thus, it is possible to use these variables simultaneously in time series analysis.

Table 2: Variables of multicollinearity
Source: Authors

Variable	FDI	Pstblt	Bcount	SCfrdm	GS
multicollinearity (VIF)	1.91	1.61	1.56	4.32	4.83

For Dubai, 25-year data (1995 to 2019) and for the cities of Abu Dhabi, Doha, Kuwait City, and Manama 20-year data (2000 to 2019) have been collected. The table no. 3 also shows the descriptive statistics of the selected data in this research, including the average, standard deviation, maximum and minimum of data for each of the variables in the five studied cities.

Table 3: Descriptive statistics
Source: Authors

City	**Variable**	**Number of obs**	**Mean**	**Std. deviation**	**Minimum**	**Maximum**
Abu Dhabi	TrstI	20	0/150	0/03	0/0882	0/1827
	Bcount	20	28/2	28/155	3	72
	GS	20	73/69	10/09	50/3	86/3
	Pstblt	20	0/829	0/128	0/56	1
	FDI	20	2463/84	1411/77	228/59	5362/40
	SCfrdm	20	0/167	0/048	0/071	0/214
Doha	TrstI	20	0/154	0/062	0/055	0/247
	Bcount	20	33/8	28/7	1	81
	GS	20	67/99	9/41	47/1	81/2
	Pstblt	20	1	0/184	0/66	1/22
	FDI	20	1799/17	2118/15	140/38	8124/74
	SCfrdm	20	0/192	0/033	0/143	0/214
Dubai	TrstI	25	0/744	0/291	0/301	1/191
	Bcount	25	168/64	149/91	7	403
	GS	25	68/36	14/163	43	86/3
	Pstblt	25	0/846	0/119	0/56	1
	FDI	25	3982/37	3167/17	239/46	10724/80

	SCfrdm	25	0/177	0/046	0/071	0/214
Kuwait City	TrstI	20	0/492	0/103	0/296	0/602
	Bcount	20	11/7	9/69	0	25
	GS	20	51/60	15/65	17/3	76/6
	Pstblt	20	0/227	0/277	-0/32	0/75
	FDI	20	623/65	942/47	21/38	3259/07
	SCfrdm	20	0/346	0/053	0/286	0/429
Manama	TrstI	20	0/819	0/144	0/615	1/247
	Bcount	20	8/25	6/08	1	16
	GS	20	74/20	5/006	62/70	80/80
	Pstblt	20	-0/449	0/551	-1/43	0/48
	FDI	20	999/04	1000/65	64/89	3727/71
	SCfrdm	20	0/186	0/091	0/071	0/286

The results of the time series regression of Abu Dhabi (located in the United Arab Emirates) Table no. 4 shows that in the period under study, the variables of the number of skyscrapers and political stability have no significant correlations with the tourist attraction index, but the variable of government spending, foreign direct investments and social freedom and civil rights have been effective in attracting tourists. The index of government spending has a coefficient factor equal to 0.00032, which shows a strong relationship between this variable and the number of tourists. The index of foreign direct investment has an impact factor equal to 0.00000141, and the index of social freedom and civil rights has a remarkable coefficient factor of 0.0064 which shows a considerable correlation with the tourist index.

Table 4: Abu Dhabi time series regression
Source: Authors

Variable	Coefficient	Std. error	P-value	Significance
Bcount	0.00039	0.00036	0.27	
GS	0.00032	0.00025	0.035	**
Pstblt	-0.007	0.019	0.692	
FDI	$1.41*10^{-6}$	$1.03*10^{-6}$	0.065	*
SCfrdm	0.0064	0.0018	0.001	***
Cons	-0.003	0.004	0.449	
AR(1)	0.671	0.254	0.008	***
MA(1)	-1	0.152	0.001	***
Model = ARIMA (1,1,1)		Residuals normality (Kolmogorov-Smirnov test)>0.150		
Number of observations = 20		Residuals correlation test P-value = 0.314		
Akaike crit. (AIC) = -185.1		*** = 99% reliable, ** = 95% reliable, and *=90% reliable		

The results of the time series regression analysis of Doha (located in the country of Qatar) according to the Table no. 5, indicate that in the period of 2000 to 2019, the variables of the number of skyscrapers, political stability, and social freedom and civil rights do not have a significant relation with tourist attraction index, but the variables of government spending and foreign direct investment both have significant effects on tourist attraction. The index of government spending has a coefficient factor of 0.00068 and the index of attracted foreign investment has a coefficient factor equal to 0.0000126.

Table 5: Doha time series regression
Source: Authors

Variable	Coefficient	Std. error	P-value	Significance
Bcount	0.0014	0.0013	0.29	
GS	0.00068	0.00061	0.027	**
Pstblt	-0.014	0.023	0.541	
FDI	$1.26*10^{-5}$	$1.13*10^{-5}$	0.053	*
SCfrdm	0.080	0.133	0.548	
Cons	-0.0019	0.139	0.748	
AR(1)	1.45	0.139	0.001	***
MA(1)	-0.99	0.233	0.001	***
Model = ARIMA (1,1,1)		Residuals normality (Kolmogorov-Smirnov test) =0.092		
Number of observations = 20		Residuals correlation test P-value = 0.982		
Akaike crit. (AIC) = -159.4		*** = 99% reliable, ** = 95% reliable, and *=90% reliable		

Based on the results of the time series regression of Dubai (located in the United Arab Emirates) it can be concluded that in the period from 1995 to 2019, the variables of the number of skyscrapers and social freedom and civil rights have no significant correlation with the number of international tourists, but the variables government spending, political stability, and foreign direct investments have a significant correlation with the international tourist attraction index. The index of government spending has a significant coefficient equal to 0.00049, the index of political stability has a high impact factor equal to 0.00394, and the index of foreign direct investment has an impact factor equal to 0.0000282, which indicate the strong correlation of this index and the number of tourists.

Table 6: Dubai time series regression
Source: Authors

Variable	Coefficient	Std. error	P-value	Significance
Bcount	-0.00024	0.0004	0.578	
GS	0.00049	0.00011	0.045	**
Pstblt	0.00394	0.00288	0.065	**
FDI	$2.82*10^{-5}$	$2.15*10^{-5}$	0.034	**
SCfrdm	0.584	0.395	0.139	
Cons	0.0459	0.010	0.000	***
AR(1)	1.039	0.171	0.000	***
AR(2)	-0.566	0.161	0.000	***
MA(1)	-1	0.126	0.000	***
Model = ARIMA (2,1,1)		Residuals normality (Kolmogorov-Smirnov test)> 0.150		
Number of observations = 25		Residuals correlation test P-value = 0.970		
Akaike crit. (AIC) = -142.5		*** = 99% reliable, ** = 95% reliable, and *=90% reliable		

The time series regression analysis of the Kuwait City (located in the country of Kuwait) according to the Table no. 7, indicates that from 2000 to 2019 the variables of government spending and foreign direct investment do not have any correlation with the variable of the number of tourists, but the variables of the number of skyscrapers, political stability, and social freedoms and civil rights are effective indicators with a remarkable impact factor in attracting international tourists. According to the results of the analysis, the index of the number of skyscrapers has a coefficient factor of 0.0077, the index of the political stability coefficient is 0.0036, and the index of social freedom and civil rights coefficient is 0.0031.

Table 7: Kuwait City time series regression
Source: Authors

Variable	Coefficient	Std. error	P-value	Significance
Bcount	0.0077	0.0098	0.006	***
GS	0.00036	0.00032	0.256	
Pstblt	0.0036	0.0175	0.001	***
FDI	-0.0000169	$7.04*10^{-6}$	0.160	
SCfrdm	0.0031	0.0009	0.001	***
Cons	-0.0022	0.0005	0.000	***
AR(1)	-0.1842	0.2065	0.000	***
AR(2)	-0.7590	0.1679	0.000	***
MA(1)	-1	0.1785	0.000	***
Model = ARIMA (2,2,1)		Residuals normality (Kolmogorov-Smirnov test)> 0.150		
Number of observations = 20		Residuals correlation test P-value = 0.667		
Akaike crit. (AIC) = -149.42		*** = 99% reliable, ** = 95% reliable, and *=90% reliable		

Regarding the city of Manama (located in Bahrain), the results of the time series regression analysis between 2000 and 2019 according to the Table no. 8 shows that there is no clear relationship between the tourist attraction index and the variables of the number of skyscrapers, the foreign direct investment or social freedom and civil rights. On the other hand, the variables of political stability and government spending are effective indicators that have had a significant impact on attracting international tourists. According to the results of the

regression analysis, the variable of the political stability coefficient is 0.0158 which is so remarkable and the variable of the government spending coefficient is significant and is equal to 0.0019.

Table 8: Manama time series regression
Source: Authors

Variable	Coefficient	Std. error	P-value	Significance
Bcount	-0.00087	0.00019	0.163	
GS	0.0019	0.0007	0.000	***
Pstblt	0.0158	0.0083	0.049	**
FDI	$1.25*10^{-6}$	0.0000257	0.961	
SCfrdm	-0.3090	0.4087	0.450	
Cons	-0.0891	0.0750	0.000	***
AR(1)	-0.1636	0.0697	0.041	**
AR(2)	-0.7590	0.1679	0.728	
MA(1)	-0.4807	0.6314	0.446	
MA(2)	-0.5192	0.6192	0.402	
Model = ARIMA (2,1,2)		Residuals normality (Kolmogorov-Smirnov test)= 0.108		
Number of observations = 20		Residuals correlation test P-value = 0.923		
Akaike crit. (AIC) = -76.17		*** = 99% reliable, ** = 95% reliable, and *=90% reliable		

Discussion

The findings of the research indicate that contrary to expectations, the number of constructed skyscrapers in the cities studied (except Kuwait City) has not been an effective factor to promote tourism in the long term. To interpret this result, three concepts can be mentioned. First, in the Middle East, one of the objectives of skyscraper construction was to create physical and visual distinctions in the host cities to bring city branding and tourist attraction. It seems that as this policy has been repeated in many cities in the 21st century, it has caused a striking resemblance in the tall cities and the distinction between these cities has decreased. Therefore, the effectiveness of this policy in promoting tourism has not been significant in the long term.

Second, there is a possibility that the construction of skyscrapers has contributed to an increase in the number of tourists in the short term but did not last for a long period. Since in this study, the role of tall buildings has been analyzed over a period of 20 to 25 years, the short time efficiency of these buildings has not been shown in the results. Considering this, the results obtained in the case of Kuwait City can be reasonable. Although construction of tall buildings in the Kuwait City started at the beginning of the 21st century, but until 2010, only 10 skyscrapers were built in this city. The mass construction of such buildings grew remarkably only in the last decade. Therefore, as this trend has started not more than a decade, the relationship between the number of skyscrapers and the growth in the number of tourists can be logical in this city.

Third, the statistics of the World Bank show that in the last decade, destinations with natural and historical attractions and recreational facilities have hosted more tourists than before. Since the largest number of international tourists are urban dwellers, modern cities with images of skylines dominated by tall buildings might be less productive to attract tourists.

Conclusions

This study examined the impact of the number of skyscrapers to attract international tourists in 5 cities located in the Middle East along the Persian Gulf in the long term (a 25-year period for Dubai and a 20-year period for Doha, Abu Dhabi, Manama, and Kuwait City). The impact of skyscrapers has been assessed along with four other indicators that are known as effective factors in attracting international tourists. Based on the findings, the government spending index in four of the five cities under study (Abu Dhabi, Doha, Dubai, and Manama), political stability index in three cities out of five (Dubai, Kuwait City, and Manama), index of foreign direct investment in three cities (Abu Dhabi, Doha, and Dubai), and the index of social

freedom and civil rights in two out of the five cities (Kuwait City and Abu Dhabi) have been effective in attracting international tourists.

However, the direct correlation between the number of skyscrapers and the index of international tourists has been observed only in one of the cities studied (Kuwait City). Therefore, it can be concluded that the policy of skyscraper construction in order to attract international tourists has been less effective than the other indicators in the cities studied.

Table 9: The results of the influence of the defined indicators in attracting tourists in the studied cities
Source: Authors

City	Effective indicators of attracting international tourists				
	Government Spending (GS)	Political Stability (PS)	Foreign Direct Investment (FDI)	Social Freedom and Civil Rights (SCfrdm)	Number of Skyscrapers (Bcount)
Abu Dhabi	Correlated	No Correlation	Correlated	Correlated	No Correlation
Doha	Correlated	No Correlation	Correlated	No Correlation	No Correlation
Dubai	Correlated	Correlated	Correlated	No Correlation	No Correlation
Kuwait City	No Correlation	Correlated	No Correlation	Correlated	Correlated
Manama	Correlated	Correlated	No Correlation	No Correlation	No Correlation

Another important point is that the results of this study were obtained by examining statistical data in the period of 20 to 25 years from the beginning of the construction of skyscrapers in the cities studied. By change of this period (considering a shorter period or a longer period with the data of the upcoming years), different results may be observed regarding the impact of some indicators, including the index of skyscrapers.

Authors Contributions

This paper is extracted from Farzad Behmanesh Nia's Ph.D. dissertation entitled "Hyper buildings and forecasting their future construction trends". Corresponding author: Seyed Rahman Eghbali (s.r.eghbali@arc.ikiu.ac.ir)

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