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STRATEGIC FACTORS IN SMART CITY DEVELOPMENT: SURVEY EVIDENCE FROM PRIVATE SECTOR OF UNITED ARAB EMIRATES

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Abstract
The development of smart cities is an area of great strategic relevance. However, it has received scant attention in the literature. This study seeks to enrich literature by providing survey evidence related to the role of private sector in building up smart cities in the United Arab Emirates (UAE). Interestingly, the UAE has been making incessant efforts to transform its cities by using smart technologies with astonishing speed. Empirical evidence gathered through a survey exercise indicates that smart human capital development and smart Management Information System have positive effect on competitiveness and sustainability of living conditions. Smart performance indicators have positive effect on sustainability. Further, strategic planning has very strong direct positive effect on smart performance indicators. However, the SEM model used in this study shows insignificant relationship between smart performance indicators and competitiveness. It also reveals insignificant relationship between strategic planning on one hand, and smart human capital development and Smart MIS on the other. The relationships revealed in this study would be of interest to decision makers in the UAE and elsewhere in the world.
Keywords: Smart cities, UAE, strategic factors, private sector, SEM, ICT.

1. INTRODUCTION

As cities grow and become urban, problems associated with growing population begin to get more complex including management of overcrowding, resources, energy consumption, and environmental issues (UN-Habitat, 2022). Such problems require smart solutions. What is required is not only the hard infrastructure, but also the readiness of human and social capital to address these problems (Abadía, et al., 2022; Caragliu et al., 2011). The state-of-art information and communications technology (ICT) is considered a key enabler, not only to solve problems, but also to achieve the goal of a smart city, which is to improve the socio-economic welfare of inhabitants.

While the concept of 'smart city' is relatively new, researchers have tried to attempt neat definitions of smart cities. Some definitions focused on the core areas that surround the delivery of services in an efficient and meaningful way. For instance, the Smart Cities Report of the United Nations Economic and Social Commission for Western Asia World Government Summit Report (2015) included within its orbit innovation in smart city development to cover socio-economic development, governance system, mobility, environmental sustainability, and standard of living . Furthermore, a study by the European Union on Mapping Smart Cities in the EU (2014) suggested a practical definition of a smart city to include public issues and their ICT-driven solutions based on collaboration between municipality and various stakeholders. The definition is extended further to include smart characteristics related to governance system, inhabitants, living styles and standards, mobility, economic management and environment (Mapping Smart Cities in the EU, 2014). Caragliu et al., (2011) defined a city to be smart on the basis of carefully-planned investments in human resources and infrastructure projects that lead to sustainable economic development and better quality of life with effective management of natural resources and fruitful governance strategy.

The smart city projects unveiled by different governments also appeal to private sector organizations. Deloitte (2015) estimated global smart cities market size at US$ 1.5 trillion in 2020. Nearly US$ 100 billion is likely to be invested in smart city applications by 2024 (Visvizi & Lytras, 2018). Prominent multinational enterprises such as Accenture, IBM, Cisco, Schneider and Philips have established business units to exploit the opportunities stemming from smart city projects. Innovation, talent, and capital provided by private sector are essential to the urban development process, as it can play an important role from project design to implementation, operations and maintenance, thus leading to sustainability of urban development and service initiatives (UNDESA, 2015)

Typically, smart city projects are anchored in government policy tracks to improve the quality of urban life. Government departments such as municipalities quite often manage them. Many smart city projects, however, die at the pilot-test stage and fail to achieve their overarching objectives, mainly due to lack of partnership with other stakeholders including private sector organizations (van Winden, 2016). This study, therefore, attempts to find out how private sector's strategic management framework can be used to transform urban localities into smart cities. The study, it is hoped, would have important policy implications for smart cities around the world.

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Insights from literature indicate that the development of a smart city based on a strategic management framework can of course improve the quality of life of its residents. It may also motivate entrepreneurs to undertake business activities and create a well-planned and positive environment for comfortable and modern localities (Shaban & Datta, 2019). The transformation of urban areas into smart cities is a strategic management mission, as it requires timely and successful management of relevant tasks from status-quo inventory to strategy development and capacity building. The process also involves setting up different strategy execution steps, fulfilling key projects, enhancing action plans and sharing the best cases and initiatives (van Winden, 2016). Therefore, it appears logical to use the basic framework of strategic management to develop this paper and address the existing gaps in knowledge.

2. STUDY SETTING, LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1. The quest for smart cities in the UAE

The United Arab Emirates (UAE) founded on December 1971, includes seven emirates: Abu Dhabi, Dubai, Sharjah, Ajman, Ras Al Khaimah, Umm Al Quwain, and Fujairah. With a GDP of US$ 421.14 billion and a growth of 45.3% between 2010 and 2019, it has emerged as the second largest economy in the Gulf region (National Accounts of the Federal Competitiveness and Statistics Authority, 2019). The population of UAE reached 9.37 million in 2018, with an average growth rate of 0.67% (NAFCSA, 2019)

The UAE has been, for a long time, among the leading nations in the Middle East in terms of penetration rates of Internet, smartphones, and broadband. According to the International Telecommunication Union (2019), percentage of the population using the Internet is 99.15%. Moreover, subscription of mobile phones stands at 200.6%, while around 98.98% of the citizens have active accounts in different social media (Global Media Insight, 2020). In addition, with its unique strategic position as well as the advanced infrastructure, the UAE has attracted more than 300 international and regional ICT firms to locate their regional hubs within the country.

The government of UAE has taken steps to move towards smart governance. This has resulted in laying out the foundation for smart cities in different emirates of the UAE including, most notably, Dubai, Abu Dhabi, Sharjah, and Ajman. Nearly 95% of Dubai government services are now available online (Salem, 2016). In June 2013, and in line with the initiative to transform to an age of smart government, the name of Dubai e-Government was changed to Dubai Smart Government (Smart Dubai Government, 2016). The new mission was to ensure the availability and outreach of the public services 24 hours a day through smart mobile devices. On that front, Smart Dubai Government launched MyID, a single sign-on gateway to more than 640 services provided by 15 government departments. Later on, MyID was replaced by UAEPASS, which is considered the first national digital identity that enables Dubai residents to get into over 5,000 government services in the city as well as at the national level (Global Government Forum, 2020). While the service offers customers with an easy platform to access many smart services provided by different entities, it also raises the efficiency of internal workflow between the government bodies and ensures electronic connection and integration among them. In March 2014, the Dubai Smart City vision was unveiled (Smart Dubai, 2016). Six strategic dimensions including (a) smart governance, (b) smart mobility,(c) smart environment,(d) smart people, (e) smart living and (f) smart economy. drive the initiative and support the delivery of the strategy. Furthermore, smart ICT infrastructure is a key enabler spanning all smart city dimensions and services (Smart Dubai, 2016).

One of the objectives of Dubai Plan 2021 is to make Dubai a smart and sustainable city. Dubai's Smart City project plans to transform around 1000 public services in various sectors to smart services. The plan envisages achieving easy access to data, smart transport, parks and beaches, in addition to police smartphone apps and new master control room. Moreover, Dubai smart cities transformation is envisioned to merge all government bodies to form a single entity, to deliver easy, wide-ranging, and efficient services to public.

Interestingly, the strategic vision of UAE Government to implement smart governments and smart cities has not only been reflected in public departments, but in private sector as well. Private organizations operating in sectors such as banking, transportation, tourism, catering and retailing have leveraged on the country's readiness in terms of technological infrastructure and managed to introduce smart applications to enable fast and accurate transactions with their customers. The overall smart environment in the country has led to the introduction of many e-services and mobile applications that provided smart user-friendly services to the public.

In recent years, smart technologies have emerged rapidly in the Middle East. These technologies can certainly contribute to socio-economic development of the UAE. Moreover, these technologies can also help the UAE enhance its international competitiveness. However, there is hardly any evidence in the literature regarding the extent to which the policy decisions of the government to take the UAE in technology-driven smart direction have affected the strategies of private sector organizations. Therefore, the main objective of this study is to examine and analyse survey evidence stemming from the private sector organizations' strategies designed and implemented to help transform the UAE into a smart nation. By doing so, our paper provides a more coherent conceptualization of strategic factors in smart city development than what is currently available in the literature.

2.2. Literature on Smart Cities

In view of proliferation of smart technologies clustering around the nerve centres of socio-economic activities in various parts of the world, recent years have witnessed considerable academic and

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professional interest in the emergence of smart cities. This section presents a review of extant literature focusing on smart cities with a view to gaining deeper insights as well as to identify gaps in knowledge.

In contemporary literature, Sanchez et al (2011) developed a new framework related to smart cities where strategic management was highlighted to be of critical importance. In this paradigm, smart cities play a strategic role to increase the efficiency of the infrastructure and other services. Washburn et al., (2009) argued that smart cities bring within their wake new service offerings and innovative practices that improve efficiency of the entire urban planning exercise. The UAE's development tracks reflect government's strong support for using smart technologies, particularly for urban development.

Perera et al., (2014) focused on telecommunications technology in the UAE. The study highlighted that Dubai is in the process of becoming a smart city due to the advanced Internet access. The steps that Dubai has taken in recent years have certainly enabled complete Internet access throughout the city. The robust infrastructure is the basis for developing a solid industrial base in the country (Perera et al., 2014). The Expo 2020, organized by Dubai with great passion and emphasis, has also paved the way for the creation of a comprehensive infrastructure for smart city development.

Lee et al., (2013) focused on the strategies designed by Dubai to pave way for its transformation into a smart city. The strategies designed and implemented by Dubai appear to be in line with the guide provided by Harrison & Donnelly (2011). According to this study, private sector's role is critical in any city's smart strategy development. Therefore, it is important for the government to address private sector's e-service needs to facilitate the development of a smart city. The e-services offered by the private sector can of course accelerate the pace of smart city development. The smart technology architecture developed for the private sector can certainly contribute to the process of creating smart cities (Harrison & Donnelly, 2011). The policy makers in the UAE have taken strategic steps to promote an e-services culture in the country that can automate business processes across organizations.

It is evident that literature has focused on some factors relating to the creation of smart cities. However, the strategic role of private sector has not been thoroughly examined and analysed in the context of the smart city development, particularly in the UAE. This gap in literature calls for a redirection of literature.

2.3. Hypotheses Development

Effects of Strategic Planning

Strategic planning for developing smart cities has been gathering interest in recent years. Prior to this era, it was largely an unattractive area for scholars (ABB, 2012; Abdoullaev, 2011; Komninos, 2008). It is noteworthy that management strategy and not technology alone drives digital transformation (Kane et al., 2015). Therefore, the framework developed for this study addresses how management strategy comprising the phases of strategic vision and action plan drives hard and soft infrastructure performances and Ke Performance Indicators (KPIs) in the development of smart cities. Through hard infrastructure performance, we refer to the smart Management Information System (MIS) and the soft infrastructures refers to smart human capital development.

Smart Management Information System

Strategic initiatives by smart city planners have suggested that the implementation of Management Information System (MIS) is a basis of creating a smart concept in the city (Al-Hader & Rodzi, 2009). Most studies have emphasized information technology as a facilitator of smart cities and the need for integration of technologies, systems and infrastructures to develop a smart city. However, it should be noted that information technology is just an enabler for creating a new innovative environment. Strategic planning drives smart infrastructure development to overcome challenges and seize the opportunities. Thus, we hypothesize that:

Hypothesis 1: Strategic planning has a positive influence on smart MIS.

Smart Human Capital Development

Through the right strategic planning, a smart city creates opportunities to utilize its human potential. Extant literature on smart cities has made extensive arguments on the importance of human capital for development of smart cities (Paskaleva, 2011; Liugailaite˙-radzvickiene˙ & Jucevicˇius, 2012). The development of human capital is necessary. As such human capital-centric approaches are a crucial factor in smart city development (Bria, 2012).

This leads to a hypothesis that:

Hypothesis 2: Strategic planning has a positive influence on smart human capital development.

Smart Key Performance Indicators

The strategic planning process includes KPIs, which are useful tools for guiding the development of smart cities. A set of appropriate indicators must be established and evaluated (Picioroaga et al., 2018). The strategic plan must monitor the plans, assess the results of smart cities and make appropriate decisions. It is thus hypothesized that:

Hypothesis 3: Strategic planning has a positive influence on smart KPIs.

Competitiveness and Sustainability

Smart cities are widely considered as cities able to carve out sustainable competitive advantage by creating synergy among different dimensions of infrastructure (Papa, 2013). The availability of ICTs and human capital development leads to the creation of sustainable and competitive smart cities. Research has recognized the importance of MIS, human capital and KPIs leading to competitiveness and sustainability of smart cities (Caragliu et al., 2011). In the light of these findings, the following hypotheses are proposed.

Hypothesis 4: Smart MIS has a positive influence on competitiveness.

Hypothesis 5: Smart MIS has a positive influence on sustainability.

Hypothesis 6: Smart KPIs have a positive influence on competitiveness.

Hypothesis 7: Smart KPIs have a positive influence on sustainability.

Hypothesis 8: Smart human capital development has a positive influence on competitiveness.

Hypothesis 9: Smart human capital development has a positive influence on sustainability.

Our research model explains strategic planning and its influence on outcomes. It is presented in Figure 1.

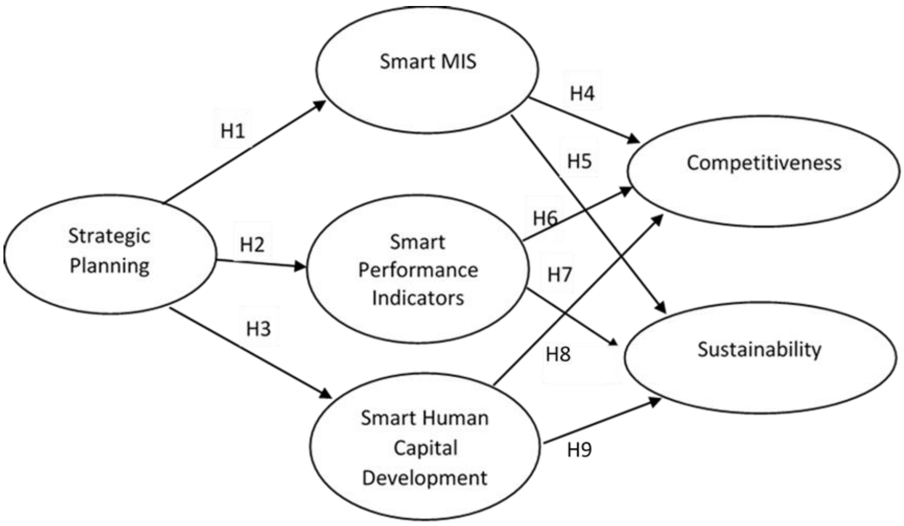

FIGURE 1 - CONCEPTUAL FRAMEWORK AND HYPOTHESIZED RELATIONSHIPS

3. METHODOLOGY

3.1. Measurement and data collection

We were motivated to undertake this study mainly because the policy makers in the UAE have been taking strategic steps to create smart cities and highlight them in the Gulf region for benchmarking purpose. We used the theoretical foundations of strategic management to develop this empirical paper (Townsend, 2013). Following a review of literature focusing on survey instruments (Shimp & Sharma, 1987), a questionnaire was developed to capture the perceptions of private sector executives. The questionnaire contained 27 items. The target population of this study included all private sector executives placed in Dubai, Abu Dhabi, Ajman and Sharjah. In view of perceived obstacles in getting probabilistic samples in a survey exercise in the Gulf region, a convenience sampling method was adopted for the purpose of this study. University students were engaged to administer the questionnaire and collect data. The method produced 207 usable responses.

The background information presented in Table 1 shows that 70.5 percent of the respondents were male and the remaining 29.5 percent of the respondents were female. The expatriate workers who completed the questionnaires were 79.7 percent of the total respondents. The maximum responses (55.1%) actually came from Dubai.

TABLE 1 - BACKGROUND INFORMATION ABOUT THE RESPONDENTS

	Percentage
Gender	
Male	70.5
Female	29.5
Nationality	
Emirati	20.3
Expatriates	79.7
Location of the Organization	
Abu Dhabi	27.1
Dubai	55.1
Sharjah	12.6
Ajman	5.3
Total number of respondents	207

3.2. Data validation and analysis

The structural equation modeling (SEM) approach was utilized to explore the relationships between the constructs under investigation. Since many years, (SEM) has been attracting large number of researchers from social sciences field. This interest stems from the need to overcome weaknesses of first generation techniques including cluster analysis, exploratory analysis, factor analysis, and logistic analysis among others (Hair, 2017).

It is worth mentioning that there are two dissimilar categories of SEM. The first one is covariance-based SEM (CB-SEM), which is mainly used to test established theoretical models. The second one is partial least squares SEM (PLS-SEM or PLS path modeling), which is mainly used to develop theories in exploratory research, which is exactly the objective of this work, thus, it is logical to implement the second category of SEM.

PLS-SEM approach has multiple advantages: First, it allows including unobservable variables measured indirectly by observable variables. Second, it simplifies the measurement error in observed variables (Chin, 1998). Third, it is efficient with small sample sizes and complex models (Cassel, Hackl, & Westlund, 1999). Fourth, it makes no distributional assumptions. Finally, it has the capacity to respond to the measurement needs of reflective and formative models. Moreover, it can treat single-item constructs without any identification constraint (Hair, 2017).

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Given these advantages, we use the partial least squares (PLS) modeling approach (estimation and evaluation) in different stages of analysis. In stage 1, we specify the structural (or the inner) model. The structural model designates relationships between latent variables (unobservable variables). The conceptual framework in Figure 1 explains the six types of constructs and the relationships among them. The strategic planning construct on the far left is an exogenous (i.e., independent) latent variable. It is modelled to predict the smart MIS, smart performance indicators and smart human capital development constructs. These smart indicators are special case; they are considered as dependent constructs because they are predicted by strategic planning. At the same time, they predict sustainability and competitiveness, therefore, independent. Finally, in the far right, sustainability and competitiveness are endogenous latent variables.

The second stage specifies the measurement model (or outer model), which reflects the relationships among constructs (factors or latent variables) and their corresponding indicator variables (items). Together, structural and measurement models represent our path model. As described by Hair et al., (2016), path models are diagrams used to visually display the constructs and variables relationships that are examined within SEM. We compute our path model using Smartpls 3.x software's PLS-SEM algorithm (Stage 3). Figure 2 displays the initial relationships between the constructs and their coefficients, and values of loadings of each item. The final stage (Stage 4) is the evaluation of the path model, which will be presented in the next section.

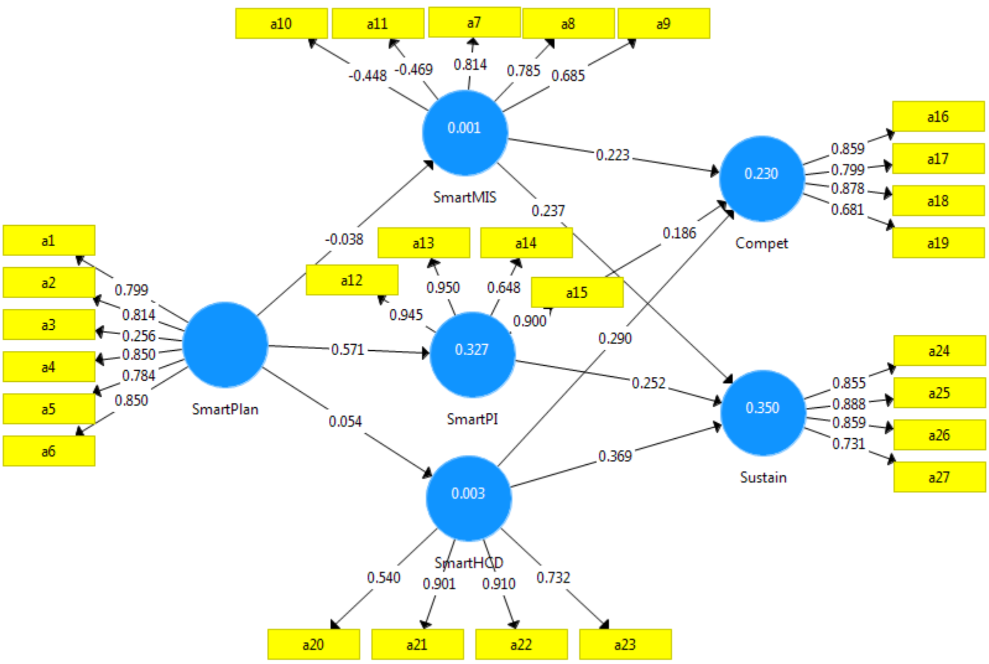

FIGURE 2: - INITIAL PATH MODEL

3.3. PLS-SEM model assessment

Tenenhaus et al., (2005) suggest three levels of assessment to judge the quality of a path model, namely, the quality of the measurement model, the effectiveness of the structural model, and of course the robustness of regression equation in the structural model.

To engage in such analysis, SmartPLS is very suitable. It can be used to neatly estimate measurement model as well as structural model at the same time (Ringle et al., 2005). We proceed in two stages. In the first stage, we assess the measurement model keeping in mind that it is reflective type. We will focus on three important indicators, namely: reliability, convergent validity, and discriminant validity. As Hulland (1999) recommends, it is necessary to use only reliable and valid constructs' measures for assessing the nature of relationships in the PLS-SEM model. In the second stage, we assess the structural through examining the model's predictive capabilities and the relationships between the constructs.

Stage 1: Measurement Model Analysis

After the convergence of our PLS path model estimation, we examine results provided by SmartPls 3.x, namely: Outer Loadings, Cronbach's Alpha, Composite Reliability, Average Variance Extracted (AVE), and Discriminant Validity. We have chosen to display Cronbach's alpha, composite reliability and Average Variance Extracted (AVE) values calculated by PLS algorithms in Table 2. In addition to Cronbach's alpha, we examine composite reliability measure to assess internal consistency reliability. This measure is preferred over Cronbach's alpha as the later demonstrates many weaknesses. With Composite Reliability's values ranging from 0.850 to 0.971, all six reflective constructs display high levels of internal consistency reliability. Average Variance Extracted (AVE) values of our constructs range from 0.727, as lowest value, to 0.918, as highest value. The results' measures of our six reflective constructs display high levels of convergent validity, as the required minimum suggested by Fornell & Larcker (1981) is 0.50. Carmines & Zeller (1979) suggest that convergent validity focuses on the relationship of a test with other tests in the context of similar constructs.

TABLE 2 - CRONBACH'S ALPHA, COMPOSITE RELIABILITY AND AVE

	Cronbach's Alpha	Composite Reliability	AVE
Compet	0.853	0.911	0.773
SmartHCD	0.806	0.888	0.727
SmartMIS	0.663	0.850	0.740
SmartPI	0.955	0.971	0.918
StratPlan	0.880	0.911	0.673
Sustain	0.854	0.902	0.699

We start by carefully examining outer loadings for potential removal. We eliminated items with outer loadings below 0.40 as suggested by Bagozzi, Yi, & Philipps (1991) and Hair et al., (2011). Moreover, we

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examined indicators with outer loadings between 0.40 and 0.70. However, removal of each one was based on its capacity to increase the composite reliability or the average variance extracted and its contribution to content validity. Figure 3 describes the final path model suitable for further investigations after the removal of weak items.

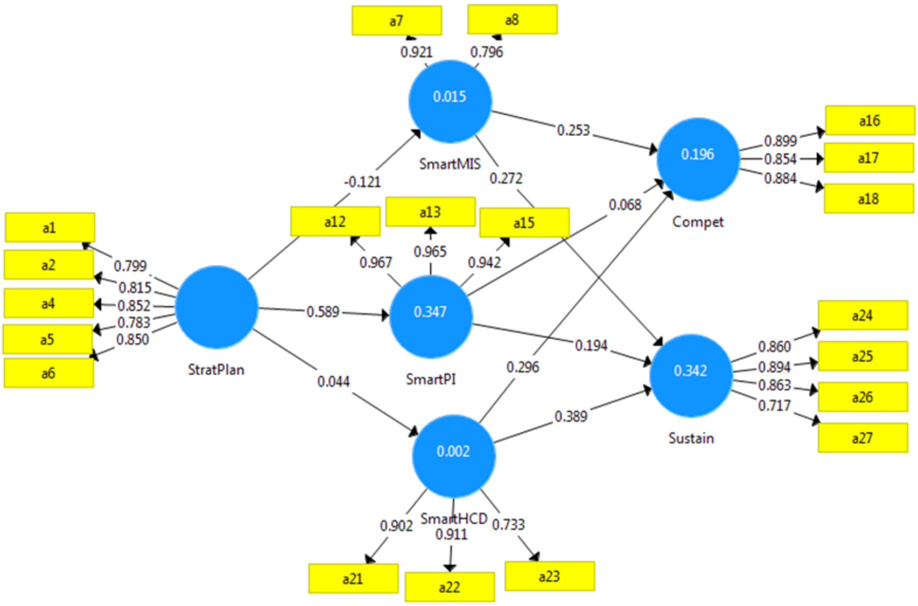

FIGURE 3 - THE FINAL PATH MODEL

All outer loadings of StratPlan, SmartMIS, SmartPI, SmartHCD, Compet and Sustain exceed threshold value of 0.70, which suggests sufficient levels of indicator reliability. Higher loadings indicate that there is more shared variance between the construct and its measures than error variance. The indicator a27 (outer loading: 0.717) has the lowest indicator reliability of 0.514 (0.71722), while a12 (outer loading: 0.967) reflects the highest indicator reliability of 0.935 (0.9672).

Finally, we assess the discriminant validity, which exhibits the degree to which any construct is incongruent with other constructs in the model (Carmines & Zeller, 1979). The Fornell-Larcker criterion is the first approach we use. It compares the square root of the AVE values with the latent variable correlations. The Discriminate validity is acceptable when constructs in the model have an AVE loading greater than 0.5. This means that at least 50% of variance in the measurement was neatly brought out in the construct (Chin, 1998). Another compulsory condition to validate the discriminate validity is that the diagonal elements should be meaningfully higher than the off-diagonal values in the corresponding rows and columns. Results revealed that all constructs passed the discriminant validity test satisfactorily.

Nevertheless, Henseler et al., (2015) suggest that the Fornell-Larcker criterion does not reliably identify discriminant validity issues. Instead, they propose considering the heterotrait-monotrait ratio (HTMT) stemming from the correlations as a remedy. Generally speaking, HTMT is the ratio of the between-trait correlations to the within-trait correlations. Henseler et al., (2015) advise a boundary-line value of 0.90. Thus, HTMT value above 0.90 reveals a weak discriminant validity. From Table 3, we can notice that all values are lower than 0.90.

TABLE 3 - HTMT RESULTS

	Compet	SmartHCD	SmartMIS	SmartPI	StratPlan	Sustain
Compet						
SmartHCD	0.429					
SmartMIS	0.407	0.248				
SmartPI	0.157	0.215	0.097			
StratPlan	0.062	0.154	0.155	0.623		
Sustain	0.484	0.58	0.467	0.315	0.145	

We perform a bootstrapping procedure using 5000 subsamples (figure 4) to derive confidence interval and to check whether the HTMT values are significantly different from 1. Table 4 indicates that no confidence interval comprises the value 1. The bootstrap confidence interval results of the HTMT criterion confirms our conclusion about the discriminant validity of the constructs.

TABLE 4 - CONFIDENCE INTERVALS FOR HTMT

	Original Sample (O)	Sample Mean (M)	Bias	Lower bounds (2.50%)	Upper Bounds (97.50%)
SmartHCD -> Compet	0.429	0.429	0.001	0.279	0.571
SmartMIS -> Compet	0.407	0.41	0.004	0.221	0.578
SmartMIS -> SmartHCD	0.248	0.264	0.015	0.096	0.395
SmartPI -> Compet	0.157	0.164	0.007	0.056	0.289
SmartPI -> SmartHCD	0.215	0.231	0.016	0.117	0.375
SmartPI -> SmartMIS	0.097	0.123	0.026	0.033	0.222
StratPlan -> Compet	0.062	0.111	0.049	0.033	0.079
StratPlan -> SmartHCD	0.154	0.186	0.032	0.085	0.189
StratPlan -> SmartMIS	0.155	0.178	0.022	0.061	0.300
StratPlan -> SmartPI	0.623	0.623	0	0.533	0.711
Sustain -> Compet	0.484	0.488	0.004	0.334	0.608
Sustain -> SmartHCD	0.580	0.577	-0.002	0.394	0.741
Sustain -> SmartMIS	0.467	0.471	0.004	0.285	0.602
Sustain -> SmartPI	0.315	0.317	0.002	0.181	0.474
Sustain -> StratPlan	0.145	0.173	0.028	0.063	0.205

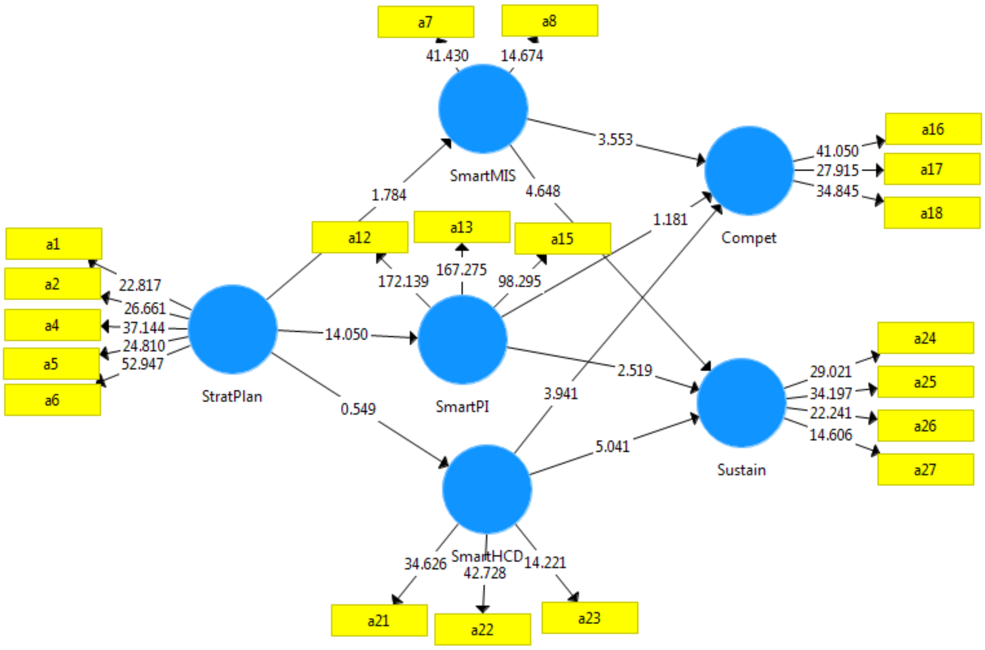

FIGURE 4 - BOOTSTRAPPING RESULTS

Stage 2: Structural Model Analysis

We continue our path model evaluation by proceeding with the evaluation of the structural model as described in Figure 3. A prerequisite is to check whether collinearity among the predictors constructs represents a critical issue for our structural model. This is possible through the examination of the VIF values of all sets of predictor constructs in the structural model.

TABLE 5 - VIF VALUES

	Compet	SmartHCD	SmartMIS	SmartPI	StratPlan	Sustain
Compet						
SmartHCD	1.073					1.073
SmartMIS	1.045					1.045
SmartPI	1.036					1.036
StratPlan		1	1	1		
Sustain						

Table 5 reveals the VIF values of all combinations of endogenous constructs and their corresponding predictors. Endogenous constructs are situated in the columns, while exogenous or predictors are situated in rows. Precisely, we assess combination of predictors constructs for collinearity: (1) SmartHCD, SmartMIS, SmartPI as predictors of Compet and (2) Sustain; (3) StratPlan as predictor of SmartHC; (4) StratPla as predictor of SmartMIS and; finally, (5) StratPlan as predictor of SmartPI. All VIF values should be below 5 as rule of thumb, which is clearly the case in Table 7. Thus, collinearity among the predictor constructs does not weaken our structural model.

To evaluate the statistical significance of each path coefficient and confirm that is different from zero, we perform again a bootstrapping procedure using 1000 sub-sample recommended by Chin (1998). Table 6 displays hypothesized path coefficients along with their bootstrap values, 'T' values. From the nine existing path connecting the measures in the structural model, five were positive and highly significant (at 1%), one was positive and significant (5%) and the remaining three were statistically insignificant.

TABLE 6 - PATH COEFFICIENTS AND THEIR BOOTSTRAP VALUES, 'T' VALUES

		Orig. Sample (O)	Mean (M)	S.D. (STDEV)	T. Statistics	P -Values	Outcome
H1	StratPlan -> SmartMIS	-0.121	-0.119	0.068	1.784	0.075	Rejected
H2	StratPlan -> SmartPI	0.589	0.589	0.042	14.05	.000	Accepted
H3	StratPlan -> SmartHCD	0.044	0.043	0.081	0.549	0.583	Rejected
H4	SmartMIS -> Compet	0.253	0.254	0.071	3.553	.000	Accepted
H5	SmartMIS -> Sustain	0.272	0.273	0.059	4.648	.000	Accepted
H6	SmartPI -> Compet	0.068	0.066	0.058	1.181	0.238	Rejected
H7	SmartPI -> Sustain	0.194	0.196	0.077	2.519	0.012	Accepted
H8	SmartHCD -> Compet	0.296	0.296	0.075	3.941	.000	Accepted
H9	SmartHCD -> Sustain	0.389	0.389	0.077	5.041	.000	Accepted

From Table 6, we observe that the relationships between StratPlan and SmartMIS as well as between StratPlan and SmartHCD are insignificant. However, the relationship between StratPlan and SmartPI is significant with β=0.589 and t=14.05 indicating that StratPlan has very strong direct positive effect on SmartPI. SmartMIS and Compet is significant with β=0.253 and t=3.553 indicating that SmartMIS has direct positive effect on Compet. In addition, SmartMIS has direct positive effect on Sustain with β=0.272 and t=4.648. Conversely, the relationship between SmartPI and Compet is insignificant with low T-Statistics (t =1.181). However, the relationship between SmartPI and Sustain is significant (at 5%) with β=0.194 and t=2.519 indicating that SmartPI has direct positive effect on Sustain. SmartHCD and Compet is significant with β=0.296 and t=3.941 indicating that SmartHCD has direct positive effect on Compet. Similarly, the relationship between SmartHCD and Sustain is significant with β=0.389 and t=5.041 indicating that SmartHCD has direct positive effect on Sustain. Moreover, the relationship between

We turn now to the calculation of R2, which gives us an indication of how much each construct's variation in percentage terms is brought out by the model. The main purpose of PLS is to explicitly explain variance to the maximum possible extent rather than the fit. Therefore, measures seeking prediction such as R2 are normally used to assess PLS models (Chin, 1998). Even though, the interpretation of the R2 value may vary according the type of model and field of research. In our case, SmartMIS (0.018), SmartHCD

(0.008), Compet (0.214) are considered weak. SmartPI (0.267) and Sustain (0.359) are considerate moderate following the rules of thumb.

Next, we analyze the effect sizes f2 for all structural model relationships. Table 7 exhibits the f2 values for all existing combinations of endogenous constructs and their corresponding exogenous ones. Cohen (1988) suggests that $f2$ values of 0.02, 0.15, and 0.35, respectively, signify small, medium, and large effects. In our model, we observe that SmartHCD has small effect of 0.101 on Compet but has medium effect on Sustain. In addition, SmartMIS has small effect of 0.076 on Compet and 0.108 on Sustain. In the same way, SmartPI has no effect on Compet (0.006) and small effect of 0.055 on Sustain. However, StratPlan has no effect on SmartHCD and SmartMIS has very large effect on SmartPI of 0.532.

TABLE 7 - EFFECT SIZE *F2*

	Compet	SmartHCD	SmartMIS	SmartPI	StratPlan	Sustain
Compet						
SmartHCD	0.101					0.214
SmartMIS	0.076					0.108
SmartPI	0.006					0.055
StratPlan		0.002	0.015	0.532		
Sustain						

Finally, the last step to evaluate the quality of path model is by calculating the Q2 statistic, which measures the predictive relevance of the model. If Q2 is greater than zero, then the model has predictive relevance (Fornell & Cha, 1994). To obtain Q2, we run blindfolding procedure. Table 8 displays the results of blindfolding procedure, with the first column (SSO) showing the sum of the squared observations, second column (SSE) shows the sum of the squared prediction errors, and the third column is Q2. As we can observe, the Q2 values of all endogenous constructs are above zero except SmartHCD. More specifically, SmartPI and Sustain have the highest Q2 values (0.265) and (0.191) respectively, followed by Compet (0.125). These results confirm the model's predictive relevance regarding the chosen endogenous latent variables.

TABLE 8 - CONSTRUCT CROSS-VALIDATED REDUNDANCY

	SSO	SSE	Q^2 (=1-SSE/SSO)
Compet	621	543.19	0.125
SmartHCD	621	620.818	0
SmartMIS	414	411.908	0.005
SmartPI	621	456.561	0.265
StratPlan	1,035.00	1,035.00	
Sustain	828	670.248	0.191

4. DISCUSSIONS

This paper explored the extent to which smart city-related strategies designed by private sector in the UAE are in harmony with government initiatives and relevant infrastructure development. The study investigated the interlinkages among six constructs including smart MIS, smart performance indicators, and smart human capital development in addition to competitiveness, sustainability, and strategic planning in order to identify the key factors that contributed to the success of the overarching smart city strategy. The private sector executives seem to recognize the positive impact of strategic planning on smart performance indicators. Similarly, executives appreciate the role that smart human capital development and smart MIS can play to enhance competitiveness and sustainability. These findings can help in identifying priority areas and striking a balance between personnel-centric and technology-centered models. Moreover, the results suggest the tracks in which executives can align their day-to-day operations with government's smart strategies.

The findings demonstrate that the private sector executives, in general, agreed with the importance and relevance of using strategic management framework to implement vision, mission, goals and objectives of the smart city project in the UAE. The results show that smart human capital development and smart MIS have direct positive effect on competitiveness and sustainability, and that smart performance indicators have direct positive effect on sustainability. Further, strategic planning has very strong direct positive effect on smart performance indicators. However, the model shows insignificant relationship between smart performance indicators and competitiveness. It also reveals insignificant relationship between strategic planning on one hand, and smart human capital development and Smart MIS on the other.

5. IMPLICATIONS FOR POLICY

This study makes a case for strategic co-operation between public and private sectors to develop smart cities in the UAE. This kind of co-operation requires simultaneous and concerted action on different fronts by various policy actors concerned. However, effective concerted action needs a common policy framework agreed between the public and private sectors.

Lessons of experience for public policy suggest that buoyant economic performance does not necessarily assure a similar performance in smart city projects. In fact, improving quality of life of people requires a sustained implementation of smart strategy across public and private sector organizations. Policy tracks involve building innovative capacity to conduct meaningful smart city development exercises, ensuring buy-in from all actors to the effective functioning of smart technology mechanism in the country.

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The role of private sector and its effective interactions with government organizations constitute a useful complement to the basic mechanism in allocating resources. Effective mechanism can address the issues related to efficiency and competitive advantage for the UAE through new ideas, and can reduce policy uncertainty. When government organizations and private sector collaborate effectively, they can lead to more efficient allocation of resources, conduct a more appropriate smart city development policy, remove the biggest obstacles to socio-economic development and create robust and sustainable smart cities. In the context of the UAE, however, it is important to observe that smart city strategies designed in tandem with a traditional model of government-driven development model need to be accompanied by a set of private sector-driven principles, or risk becoming collusive .

The successful strategies designed and implemented in several developed nations suggest that the determinants of smart city project are many and context-specific. Macro-level policies, micro-level strategies, human development strategies, technological advancement and innovation, conducive business environments, and smart infrastructure development in both rural and urban areas are all considered vital in facilitating smart transformation of nations. The scholars generally agree that the issues facing policy makers interact each other and must be tackled in an inclusive and integrated policy framework to achieve the mission of smart cities (Al-Hader & Rodzi, 2009;McKinsey, 2019).

Smart city initiatives in the UAE may contribute positively to innovations in the economy and boost international competitiveness efforts. They may also facilitate the process of smart infrastructure development, regional economic growth and human capital development. They might take the UAE economy in a new direction where there is public understanding and support for working closely with private sector organizations to achieve the avowed goal of innovation, especially in the context of smart city project.

6. LIMITATIONS AND FUTURE RESEARCH DIRECTION

The results of this study need to be interpreted in view of some of its limitations. First, the sample size was rather modest. While this is not uncommon for exploratory research (e.g., Dillman, 1978), we recommend that scholars may take steps to complement our model with the aid of bigger sample size and integrate analysis of results stemming from the organizational level. Second, the constructs used in this study were based on literature review and recommendations from a virtual focus group session (including ten practitioners from the Gulf region) organized by the authors.

Future research could consider focusing on additional constructs in view of the emerging trends related to Artificial Intelligence (AI) in the UAE and elsewhere in the world. Researchers could attempt a deeper analysis in future by conducting qualitative studies focusing on smart strategies designed by private sector organizations in innovation contexts. Such studies could shed more light on a cross-section of private sector organizations seeking to contribute swiftly to government policy tracks related to smart city project (Mora, et.al., 2019). In this study we focused on reactive adjustments made by the private sector in response to the government initiatives. To triangulate the proactive strategies, we recommend that future research studies collect data on both proactive and reactive responses designed by the private sector organizations to attain the objectives of smart city projects. Finally, our statistical analysis suggests that common method bias did not exist to affect our data. However, in order to refine empirical research designs, future researchers may consider collecting data at different time-points.

7. CONCLUSIONS

This study advanced our understanding of the strategic role that the private sector can play in supporting government policy track related to smart cities. This study also contributed to the literature by linking strategic management dimensions with the smart city project in the UAE

Our arguments suggest that while governments may be well equipped with resources to initiate ambitious smart city projects, there is no guarantee that the projects would come to fruition. By providing empirical evidence, we offer a relevant contribution to the literature by focusing on the role of private sector in smart city development. The responses to the structured questionnaire coming from private sector executives conclusively suggest that a robust strategic management framework is invaluable for successfully implementing the smart city project in the UAE.

The research work indicates that smart city is defined by scholars and practitioners belonging to various domains. It is our belief that the empirical findings presented in this study would be of interest to a broader community of scholars, drawn most notably, from urban planning, public policy and management studies, who have contributed to the literature related to smart cities but have to realize its inter-disciplinary dynamism. We believe, this study can generate further interest for scholars and practitioners to enrich our understanding of the dynamics of smart city development from complementary perspectives.

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