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Impact of six sigma methodology and strategic thinking on operational performance of tourism operations

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Abstract

Identifying and meeting the specific expectations of customers and delivering high-quality service to customers in the tourism industry is imperative for sustaining competitiveness. This study aims to identify the mediation effect of strategic thinking between six sigma and the operational performance of tourism companies in Iraq. A survey of 47 companies was conducted and analyzed using the structural equation modeling method to test the study framework. The findings suggests that strategic thinking is relevant and effective in this sector and increasing the effect of six sigma, operational performance is positively affected by the adoption of strategic thinking with six sigma. The study proves that implementing Six Sigma with strategic thinking will make processes efficient and effective which will ultimately result in increased customer satisfaction, improved product and service quality by improving the operational performance.

Keywords : Tourism, management support, focus on customer, infrastructure, training and competency, continuous improvement, SEM.

Introduction

Some organizations strive to excel in their performance to achieve their goals in the highest possible ways, and organizations whether private or governmental, the basis for which their movement governed is the work of administration in successfully employing capabilities and resources through their use of administrative thought and modern methods to achieve their mission and goals (De & Rannenberg, 2009). The importance of the services sector, its production and provision of quality began to get the attention of researchers. It is noticeable that the service sector has grown significantly in all countries, and the more economically the society advances, the more services will become a major component in the national product of this society (Narayan et al, 2010), hence the need to develop methods of administrative work and improve the quality of products, the methods used have varied, including the method of total quality management and the methodology of six measures (Oakland, 2014).

Among the most important developments that have emerged within the concepts of TQM is the term Six Sigma, which forms an innovative method used in conjunction with other TQM tools to raise the level of quality and improve operations (Chiarini, 2011). Motorola has created this term (Ramphal, 2017), and the goal of finding it was to improve the performance of operations to a degree that the number of defective items reaches 3.4 pieces per million productive pieces (Fink

& Bevington, 2010). It is important to apply quality in tourism companies, especially as tourism services differ from any service establishment in that they are directly related to the services provided, at all levels (Fernandes & Cruz, 2016).

According to Keller and Pyzdek, (2012), they explained that Six Sigma is a statistical approach or a setup that uses a data-driven approach or in some cases a continuous improvement with an aim or objective of eliminating defects in manufacturing, processing or service delivery. It is believed that the first company that tested this six sigma statistical tool was a phone company known as Motorola in 1980 (Schroeder et al, 2008). It was later absorbed by other companies including the tourism processing companies and the main aim of the invention was to minimize defects and errors in processing.

The approach was welcomed by other companies that imitated the innovation. According to Henderson and James, 2013, Motorola launched the six sigma approach in the year 1980 and their basis was on the fundamentals of quality management. One year later after they launched, General Electric that also embraced the idea some years after the success of the same in the Motorola Company (Antony & Ricardo,2012). It is clearly seen that hundreds of companies have globally adopted the same approach as a way of doing business simply because the defects are minimized, and many companies produce high quality products which promotes the economies of scale and therefore increases the market share encouraging the increase in output. An increase in output further increases the revenue. To bring a more clear in-depth insight on six sigma , Drohomeretski (2014), states that sigma represents the standard deviation of a population which shows the variation in a data set which has been collected. Therefore if a defect is present, it is defined by specification limits which separate good from the bad in a process such as a manufacturing process. The success of six sigma needs a success tool as strategic thinking, which can be considered as an effective strategic tool. Therefore, this study aims to identify the intervention effect of strategic thinking between six sigma and operational performance for tourism companies.

Literature Review

Six Sigma

According to Polis (2011) Six Sigma is a revolutionary management approach that measures and improves quality. It has become a reference method to meet the needs of customers and achieve it with levels close to perfection. (Kwak & Frank, 2006) defined six sigma as a tool used by companies to bolster their business processes. The term Six Sigma has its roots in statistics, when in the early 19th Century (Ramphal, 2018), Six sigma brings about the variations and in a nutshell the decrease and increases in variations lead to defect reduction, employee motivations and it improves the quality of products and services rendered by the companies (Nicolaides, 2008, 2012; Hahn, 2015). In some other instances, the six sigma approach can be thought to be a measure of a company's performance basing on the defects per million, this will reduce the operating costs in the tourism industry and increase customer satisfaction. More than most of the tourism industry using the six sigma approach operate with no difficulties and therefore enjoys a wider market share (Lagrosen et al, 2011).

Six sigma process or strategy enables enterprises to optimize significantly in terms of their core operations and structure through design, control of daily business activities so as to reduce waste and consumption of sources (time - energy - cost) (Pesic,2009). Six sigma is a methodology of quality management for companies and tools to improve the capacity of their business operations,

these increases or decreases in performance in the different process lead to reduce defects and improve product quality. According to (Meteab, 2018) six sigma methodology consists of five dimensions (management support, focus on customer, infrastructure, training and competency, continuous improvement).

Strategic thinking

Strategic thinking makes sense about uncertainty (Fink et al., 2005). If the future is uncertain (100%), the planning process is a waste of time. The main task is to separate predictable things from basic uncertainty, and predictable elements become known as predefined elements (Sharp & Heijden, 2008). The difference between wealth winners and those who make it difficult is simply that wealth winners move forward despite their fears, and uncertainty is not allowed to stop them .

In strategic thinking, imagination, the ability to predict and visualize the resulting concepts are important. The ability to think strategically affects the development of the organization, the work of teams in the same way as it can affect the personal development of leaders and their subordinate employees (Papulova & Gazova, 2016). Strategic thinking is the driving force of change, and the creation of organizational conditions for its use promotes the creation of innovative solutions, while positively affecting the commitment of the authors of the concept in the process of change. Strategically thinking people are sensitive to opportunities, challenges, trends and relationships arising in the environment. They have the ability to predict the effects of their impact on the strategy contained in the plans ensuring its effective updating (Hickman & Silva, 2018). There is a belief that the ability to think strategically has a huge impact on the organization's ability to survive over a long period of time, the organization has a chance to influence its future, and not just react to events that occur in it.

Operational performance

Operational performance reflects the ability of a company or a team to achieve objectives with optimal use of means, resources and financial resources over a given period (Voss et al.,1997). It can, therefore, be defined by the relationship between the objectives achieved and the means used, and it is optimal when the achievement of objectives is maximum and the means used are minimal (Samson & Terziovski, 1999). Objectives can be quantified (volume of activity, turnover, profitability, profitability, operating profit) or expressed in the form of concrete elements to be achieved (the availability of deliverables for a project for example) (Raheman & Nasr, 2007). The means can be financial resources, working days, time, raw materials, equipment, and materials, etc. (Chae et al., 2014). Operational performance can be approached relatively and compared to the performance obtained by other companies in a sufficiently close or equivalent business segment

Research Methodology

Data Collection Procedure

A total of 60 sets of questionnaires were distributed to respondents. Each form is given a code to facilitate the tracking of incomplete forms. The incomplete form is returned to the appropriate respondent to be completed. All completed forms are successfully re-collected within four days. The number of distributed questionnaires were 60 sets , with 47 valid and 13 invalid.

The questionnaire used consists of three parts, namely parts A, B and C . Part A is a question based on the respondents' background, part B is a question about factors of six sigma (SS) , part B refers to questions based on strategic thinking (ST), and part c refers to questions based on operational performance (OP). Part A includes six sigma was adapted from (Meteab, 2018), Part B strategic thinking was adapted from (Hickman & Silva, 2018), and Part C operational performance was adapted from (Chae et al, 2014). Respondents' feedback is based on five points Likert scale .

Conceptual Framework

Based on the hypothesis, the model is illustrated in Figure 1. Exogenous variables are the six sigma (SS), management support (SS1), focus on customer (SS2), infrastructure (SS3), training and competency (SS4), and continuous improvement (SS5). Endogenous variables are strategic thinking (ST) and operational performance (OP). At the same time, however, ST act as exogenous variables of OP that serve as endogenous variables. Indicators for the three influencing factors (SS, ST and OP) are based on the components contained in the three theories applied in the literature.

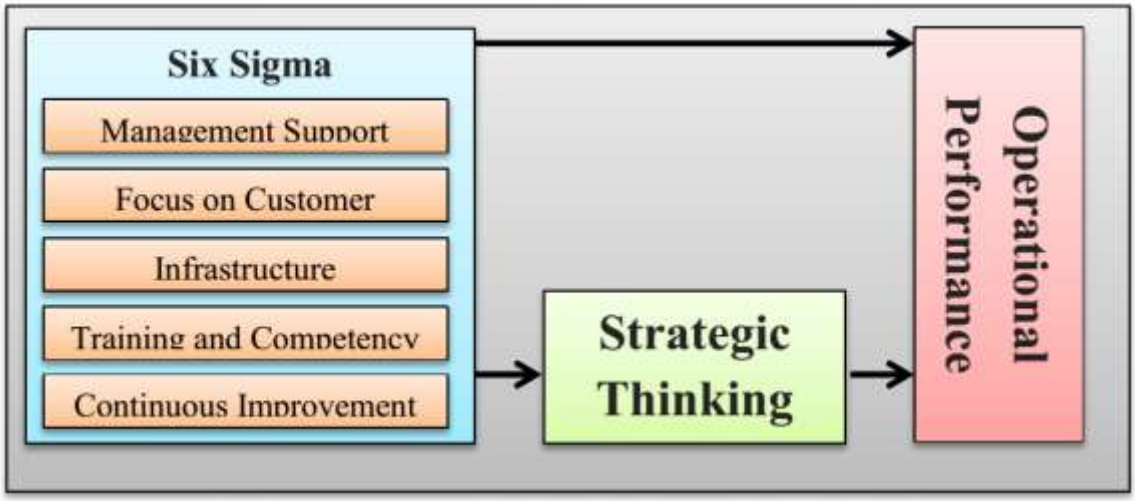

Figure .1 Conceptual Framework

Pilot Study

To ensure that items in the questionnaire are reliable and valid, the researchers have conducted a pilot study. A pilot study was conducted on another day. The implementation of the pilot study was to test the reliability and validity of the constructs in the research instrument. A total of 30 sets of questionnaires containing demographic information and all the constructs used in the study were distributed to several respondents. Of these, 27 sets of questionnaires were returned and analyzed.

In essence, a pilot survey was conducted to see whether all the instructions for each question were understood, the questionnaire items were accurate, clearly besides ensuring the objective of the study was understood by the respondents before the actual survey was conducted. The reliability coefficient for this pilot review was tested using the Cronbach alpha value, as shown in Table 1.

Table 1. Results of Credibility of the Items

Indicators	Items	Cronbach alpha values	Indicators	Items	Cronbach alpha values
SS1	q1	0.756	ST	m1	0.717
	q2			m2	
	q3			m3	
	q4			m4	
	q5			m5	
SS2	q6	0.734		m6	
	q7			m7	
	q8			m8	
	q9			m9	
	q10			m10	
SS3	q11	0.753	OP	y1	0.747
	q12			y2	
	q13			y3	
	q14			y4	
	q15			y5	
SS4	q16	0.846		y6	
	q17			y7	
	q18			y8	
	q19			y9	
	q20			y10	
SS5	q21	0.857			
	q22				
	q23				
	q24				
	q25				
SS		0.925			

Demographic profile

We investigate the influence of three main demographic factors in the responses, namely: gender (male and female); age, divided into four categories (<30, 30-40, 41-50, >50 years); and years of experience (<10, 10-20, >20 years). A total of 47 people answered the questionnaire, (87.2%) male and (12.8%) female , and most of the employees are from 30-40 years old with (59.6%), followed by the group aging between 41-50 (21.3%), those younger than 30 years old (10.6%), and lastly by a group older than 50 years old (8.5%). Regarding experience, the majority of responders are (72.3%) with 10-20 years of experience, after that the group less than 10 years of experience with (19.1%), followed by the group had more than 20 years of experience with (8.5%). Table 2 describes the demographic profile of respondents.

Table 2. Demographic profile of respondents

Characteristics	Frequency	Percentage (%)
Gender		
Male	41	87.2 %
Female	6	12.8 %
Age		
<30	5	10.6%
30-40	28	59.6%

41-50	10	21.3%
>50	4	8.5%
Years of Experience		
<10	9	19.1%
10-20	34	72.3%
>20	4	8.5%

Normality test

The normal distribution of the data is tested by the adoption of a program. The results in Table 3-5 indicate that the data follow the normal distribution. The values of the skewness and kurtosis coefficients were recorded between the (+1.96 ,-1.96), Here are the conditions that are required, This is confirmed by the histogram graph of the data as shown in Figure 2.

Table 3. Normality Test for SS Data

Variable	min	max	skew	c.r.	kurtosis	c.r.
q25	2.000	5.000	-.433	-1.391	-.452	-.727
q24	3.000	5.000	-.316	-1.015	-.788	-1.266
q23	3.000	5.000	-.242	-.777	-.879	-1.413
q22	3.000	5.000	.000	.000	-1.524	-2.449
q21	2.000	5.000	-.288	-.924	-.107	-.171
q20	2.000	5.000	-.691	-2.220	-.080	-.128
q19	2.000	5.000	-.451	-1.449	.924	1.485
q18	2.000	5.000	-.482	-1.549	.556	.894
q17	2.000	5.000	-.457	-1.469	.785	1.262
q16	2.000	5.000	-.399	-1.283	-.169	-.272
q15	2.000	5.000	-.356	-1.146	.485	.780
q14	2.000	5.000	-.610	-1.962	.179	.288
q13	2.000	5.000	-.427	-1.374	-.659	-1.059
q12	2.000	5.000	-.290	-.933	-.484	-.778
q11	1.000	5.000	-.086	-.275	-.778	-1.251
q10	2.000	5.000	-.570	-1.831	-.115	-.185
q9	3.000	5.000	-.042	-.134	-.408	-.656
q8	2.000	5.000	-.535	-1.718	-.570	-.916
q7	2.000	5.000	-.814	-2.616	.277	.445
q6	2.000	5.000	-.701	-2.253	.106	.170
q5	2.000	5.000	-.453	-1.457	-.244	-.392
q4	3.000	5.000	-.198	-.636	-.579	-.930
q3	2.000	5.000	-.290	-.933	-.484	-.778
q2	2.000	5.000	-.472	-1.517	.245	.393
q1	2.000	5.000	-.737	-2.368	.957	1.539
Multivariate					82.999	8.894

Table 4. Normality Test for ST Data

Variable	min	max	skew	c.r.	kurtosis	c.r.
m10	3.000	5.000	-.208	-.669	-.838	-1.346
m9	3.000	5.000	-.281	-.902	-.835	-1.342
m8	2.000	5.000	-.544	-1.747	.315	.507
m7	1.000	5.000	-1.096	-3.525	1.767	2.841
m6	2.000	5.000	-.675	-2.171	1.288	2.070
m5	3.000	5.000	-.338	-1.087	-1.038	-1.668
m4	1.000	5.000	-1.001	-3.217	1.672	2.688
m3	2.000	5.000	-.082	-.262	-1.227	-1.973
m2	2.000	5.000	-.656	-2.110	.386	.620
m1	3.000	5.000	-.480	-1.543	-.830	-1.335
Multivariate					41.811	10.626

Table 5. Normality Test for OP Data

Variable	min	max	skew	c.r.	kurtosis	c.r.
y10	2.000	5.000	-.486	-1.561	-.438	-.704
y9	2.000	5.000	-.420	-1.351	-.394	-.633
y8	2.000	5.000	-.569	-1.829	.548	.881
y7	2.000	5.000	-.448	-1.439	-.124	-.200
y6	3.000	5.000	.250	.805	.484	.778
y5	2.000	5.000	-.646	-2.077	.076	.123
y4	3.000	5.000	-.182	-.585	-.611	-.982
y3	3.000	5.000	-.383	-1.232	-.670	-1.078
y2	3.000	5.000	-.245	-.788	-.911	-1.464
y1	2.000	5.000	-.493	-1.583	.171	.275
Multivariate					14.964	3.803

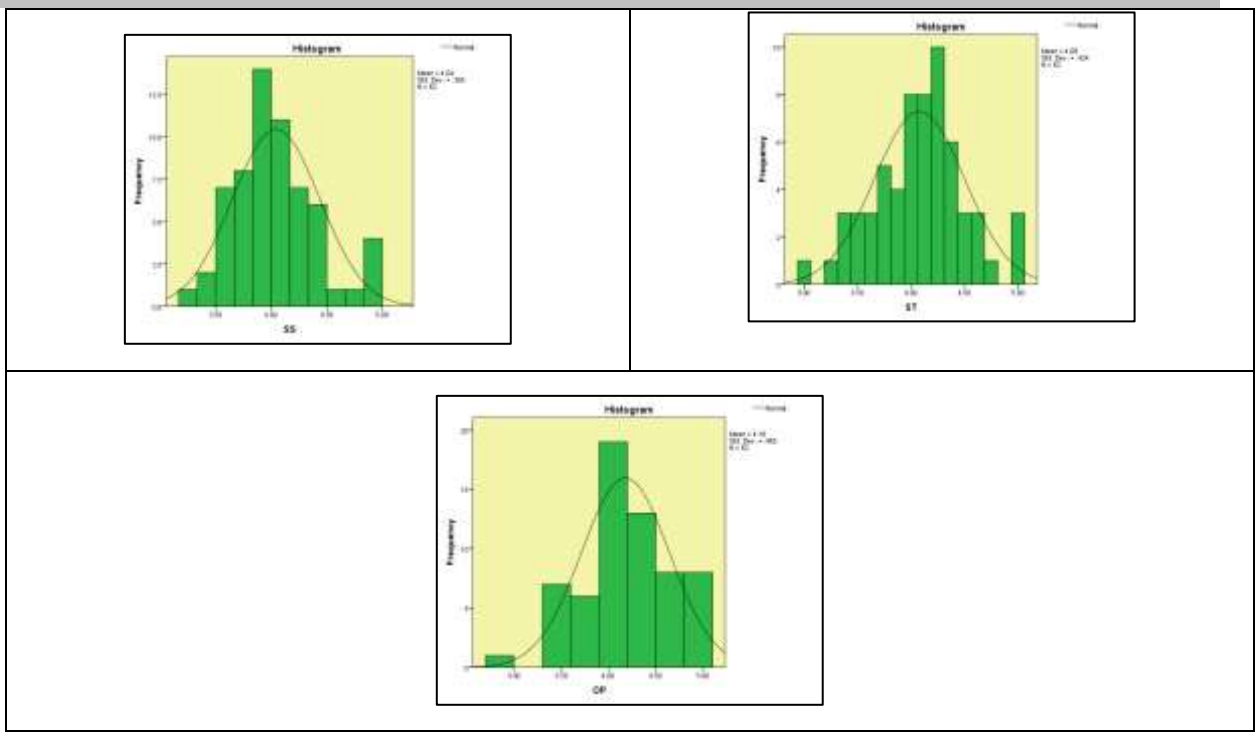

Figure 2. Normality Histogram

Descriptive Analysis

Descriptive analysis methods involving mean and standard deviation are used to determine respondents' perceptions of factors related to variables. Table 6 shows the findings from the analysis. Based on the results, SS2 recorded the highest overall mean score between the factors (M = 4.229, SD = 0.550). The SS4 factor recorded the second-highest mean (M = 4.255, SD = 0.708). and SS5 is the third reading with (M = 4.187, SD = 0.776) , while the fourth reading is to SS1 with (M = 4.161, SD = 0.566). Whereas, the SS3 factor records the lowest mean value (M = 4.131, SD = 0.531), in general SS recorded high scores with (M = 4.193, SD = 0.512) . Also the overall reading is good to ST with (M = 4.240, SD = 0.464), and to OP with (M = 4.306, SD = 0.460). All factors indicate a simple alignment based on the mean value interpretation.

Table 6. Descriptive Statistics

Factor	Min	Max	Mean	Std.
SS1	2.60	5.00	4.161	0.566
SS2	2.20	5.00	4.229	0.550
SS3	2.40	5.00	4.131	0.531
SS4	1.60	5.00	4.255	0.708
SS5	1.60	5.00	4.187	0.776
SS	2.52	4.84	4.193	0.512
ST	2.70	5.00	4.240	0.464
OP	2.30	4.90	4.306	0.460

The scatter of data refers to positive high probability as it shown in figure 3.

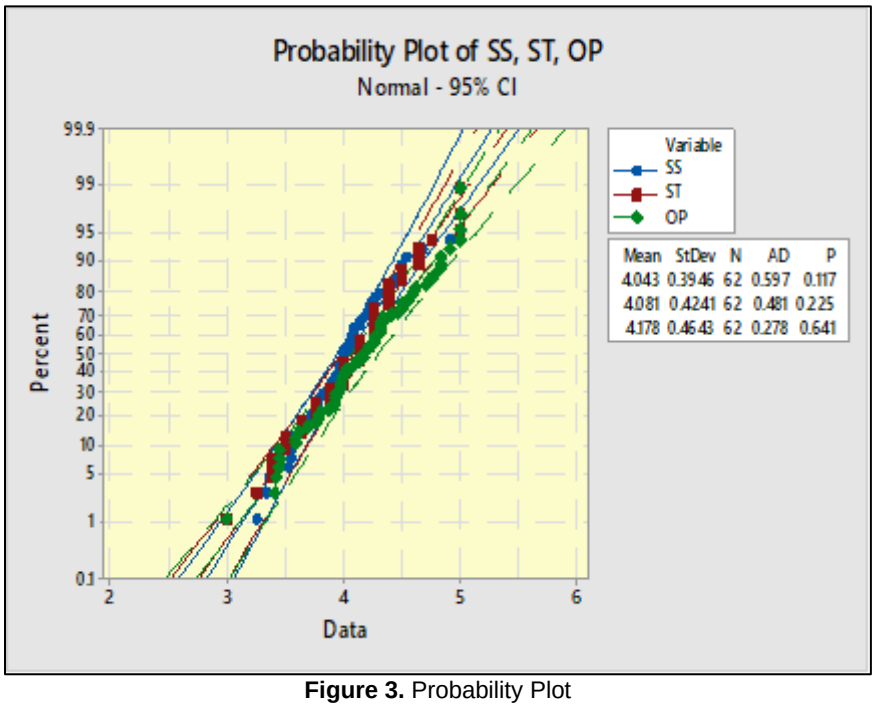

Figure 3. Probability Plot

Confirmatory Factor Analysis CFA

In order to test the model construction Amos software were used to calculate (CFA),it used to measures the relationship that validity given the sample data (Byrne, 2012) .in order to accept the model it should meet the required conditions of (Good Fit Index) in addition of CFA condition which required above 0.40 loading (Daire et al., 2008). The conditions needed appeared in Table 7.

Table 7. Fit Indices for Modeling According to SEM

Fit Index	Acceptable Threshold Levels	Description
Absolute Fit Indices Chi-Square X2	Low $\chi 2$ relative to degrees of freedom with an insignificant *p* value ($p > 0.05$)	
Relative $\chi 2$ ($\chi 2$/df)	2:1 (Tabachnik & Fidell, 2007) 3:1 (Kline, 2005)	Adjusts for sample size.
(RMSEA)	Values less than 0.07 (Steiger, 2007)	Has a known distribution. Favours parsimony. Values less than 0.03 represent excellent fit.
GFI	Values greater than 0.95	Scaled between 0 and 1, with higher values indicating better model fit. This statistic should be used with caution.
AGFI	Values greater than 0.95	Adjusts the GFI based on the number of parameters in the model. Values can fall outside the 0-1.0 range.
RMR	Good models have small RMR (Tabachnik and Fidell, 2007)	Residual based. The average squared differences between the residuals of the sample covariance and the residuals of the estimated covariance.
SRMR	SRMR less 0.08 (Hu& Bentler, 1999)	Standardized version of the RMR. Easier to interpret due to its Standardized nature.
Incremental Fit Indices		
NFI	Values greater than 0.95	Assesses fit relative to a baseline model which assumes no covariance between the observed variables. Has a tendency to fit in small samples.
NNFI (TLI)	Values greater than 0.95	Non-normed, values can fall outside the 0-1 range. Favours parsimony. Performs well in simulation studies (Sharma et al, 2005; McDonald and Marsh, 1990)
CFI	Values greater 0.95	Normed, 0-1 range.

SS Model

The model of variable SS includes five variables with 25 items , according to SEM techniques for the confirmatory factor analysis (CFA) , the model does not meet the required conditions so it should using modification to get acceptable model as shown in figure 4.

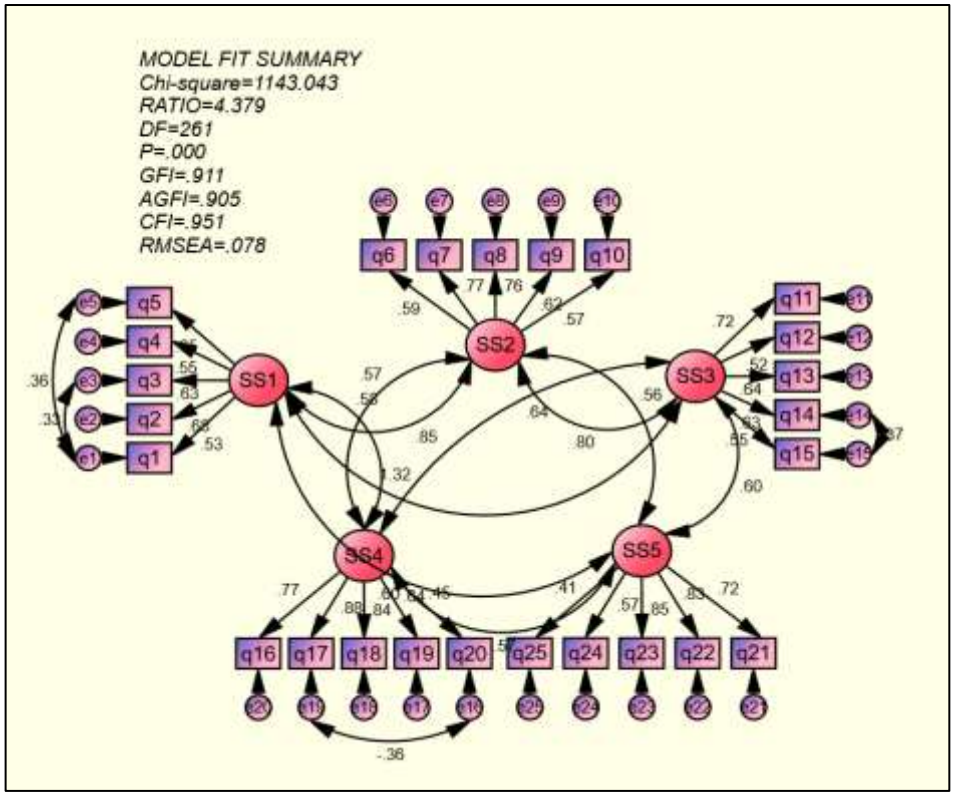

Figure 4. Modified model of SS according to (SEM)

ST Model

The model of variable ST includes 10 items , according to SEM techniques for the confirmatory factor analysis (CFA) , the model does not meet the required conditions so it should using modification to get acceptable model as shown in figure 5.

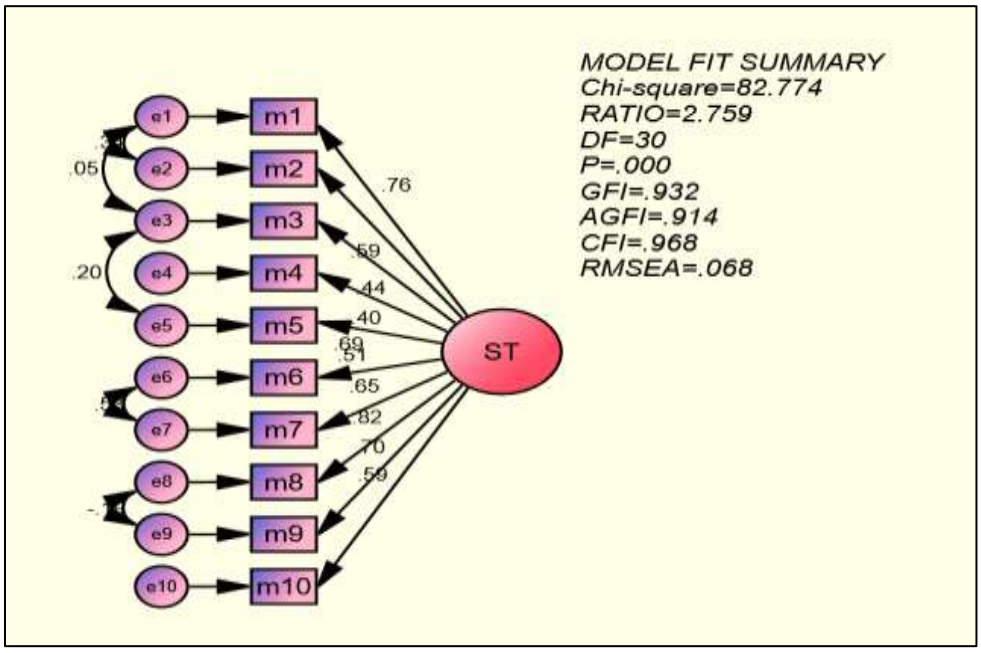

Figure 5. Modified Model of ST according to (SEM)

OP Model

The model of variable OP includes 10 items , The model of variable SS includes five variables with 25 items , according to SEM techniques for the confirmatory factor analysis (CFA) , the model does not meet the required conditions so it should using modification to get acceptable model as shown in figure 6.

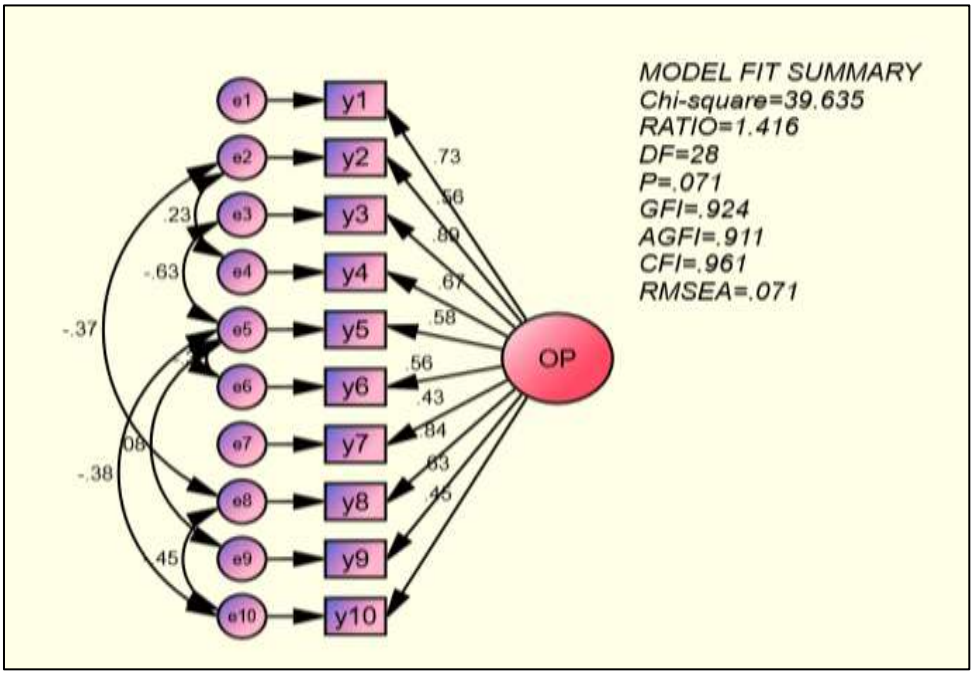

Figure 6. Modified Model of OP according to (SEM)

Correlation

The results of Table 8 indicate that there is a positive relationship between SS and OP with (0.579) which is significant because the significance level recorded a statistically acceptable value of (P <0.05), and there is a positive relationship between SS1 and OP with (0.509) which is significant because the significance level recorded a statistically acceptable value of (P <0.05), the relationship between SS2 and OP is significant, the correlation coefficient was (0.451), which is positive and significant, because the significance level recorded a statistically acceptable value (P <0.05). The results indicate there is a positive correlation between SS3 and OP of (0.429), and this relationship is significant because the significance level recorded a statistically acceptable value of (P < 0.05).

Regarding SS4, the relationship is significant, the correlation coefficient is (0.513), which is a significant positive correlation, because the the significance level recorded a statistically acceptable value (P <0.05). Also, there is a positive significant correlation between SS5 and OP of (0.458), and this relationship is significant because the significance level recorded a statistically acceptable value of (P < 0.05).

Regarding the relationship between SS and ST , the results indicate there is a positive significant correlation of (0.612), and this relationship is significant because the significance level recorded a statistically acceptable value of (P < 0.05). Also, there is a positive correlation between ST and OP of (0.692), and this relationship is significant because the significance level recorded a statistically acceptable value of (P < 0.05).

Table 8. Correlation Between Variables

	SS1	SS2	SS3	SS4	SS5	SS	ST	OP
SS1	1	.578**	.924**	.575**	.507**	.849**	.485**	.509**
T							3.719	3.970
Sig.		.000	.000	.000	.000	.000	.001	.000
SS2	.578**	1	.629**	.636**	.488**	.797**	.475**	.451**
T							3.620	3.388
Sig.	.000		.000	.000	.001	.000	.001	.001
SS3	.924**	.629**	1	.532**	.574**	.868**	.424**	.429**
T							3.136	3.181
Sig.	.000	.000		.000	.000	.000	.003	.003
SS4	.575**	.636**	.532**	1	.525**	.809**	.599**	.513**
T							5.020	4.013
Sig.	.000	.000	.000		.000	.000	.000	.000
SS5	.507**	.488**	.574**	.525**	1	.784**	.492**	.458**
T							3.792	3.454
Sig.	.000	.001	.000	.000		.000	.000	.001
SS	.849**	.797**	.868**	.809**	.784**	1	.612**	.579**
T							5.187	4.762
Sig.	.000	.000	.000	.000	.000		.000	.000
ST	.485**	.475**	.424**	.599**	.492**	.612**	1	.692**
T								6.428
Sig.	.001	.001	.003	.000	.000	.000		.000

Regression

The results of Table 9 show that there is a significant impact for SS on OP, the value of alpha 2.126 and beta value were recorded 0.520, the model explained 33.5 % of the change in the dependent variable, and the value of F is a significant and acceptable value because the value of F is greater than its tabular value, and the significance level recorded a statistically acceptable value of ($P < 0.05$). And SS has a significant impact on ST, the value of alpha 1.915 and the beta value was recorded 0.555, the model explained 37.1 % of the change in the dependent variable, and the value of F is a significant and acceptable value.

Finally, ST has a significant impact on OP, the value of alpha 1.400 and beta value was recorded 0.685. The model explained 33.6 % of the change in the dependent variable, and the value of F is significant and acceptable value because the value of F is greater than its tabular value, and the significance level recorded a statistically acceptable value of ($P < 0.05$).

Table 9. Regression analysis

V.	α	β	SE.	T	F	R	R^2	Sig
SS…>OP	2.126	0.520	0.379	4.762	22.680	0.579	0.335	0.000
SS…>ST	1.915	0.555	0.371	5.187	26.905	0.612	0.374	0.000
ST…>OP	1.400	0.685	0.336	6.428	41.314	0.692	0.479	0.000

Path Analysis

After analyzing the internal and external consistency, the internal model was tested for hypothesis testing. However, direct and indirect effects were examined in this part. all direct hypotheses were examined without the mediator. In the indirect effect, the mediation effect was tested.

Table 10, Figure 7 shows that the direct effect of SS on OP (- 0.02) is not significant at the level of (P <0.05), and the direct effect of ST on OP (0.940) is significant at the level of (P <0.05), the direct effect of SS on ST (0.910) is significant at the level of (P <0.05), also the indirect effect of SS on OP (0.855) is significant at (P <0.05) . accordingly, the indirect effect (mediation effect) is more effective than the direct effect, that's mean ST is necessary to the relationship between SS and Op. these results support the path hypothesis.

Table 10. Path analysis result

Path	Effect	P Value
SS…>OP	-0.02	0.412
ST...>OP	0.940	0.014
SS…>ST	0.910	0.000
SS…>ST…>Op	0.855	0.000

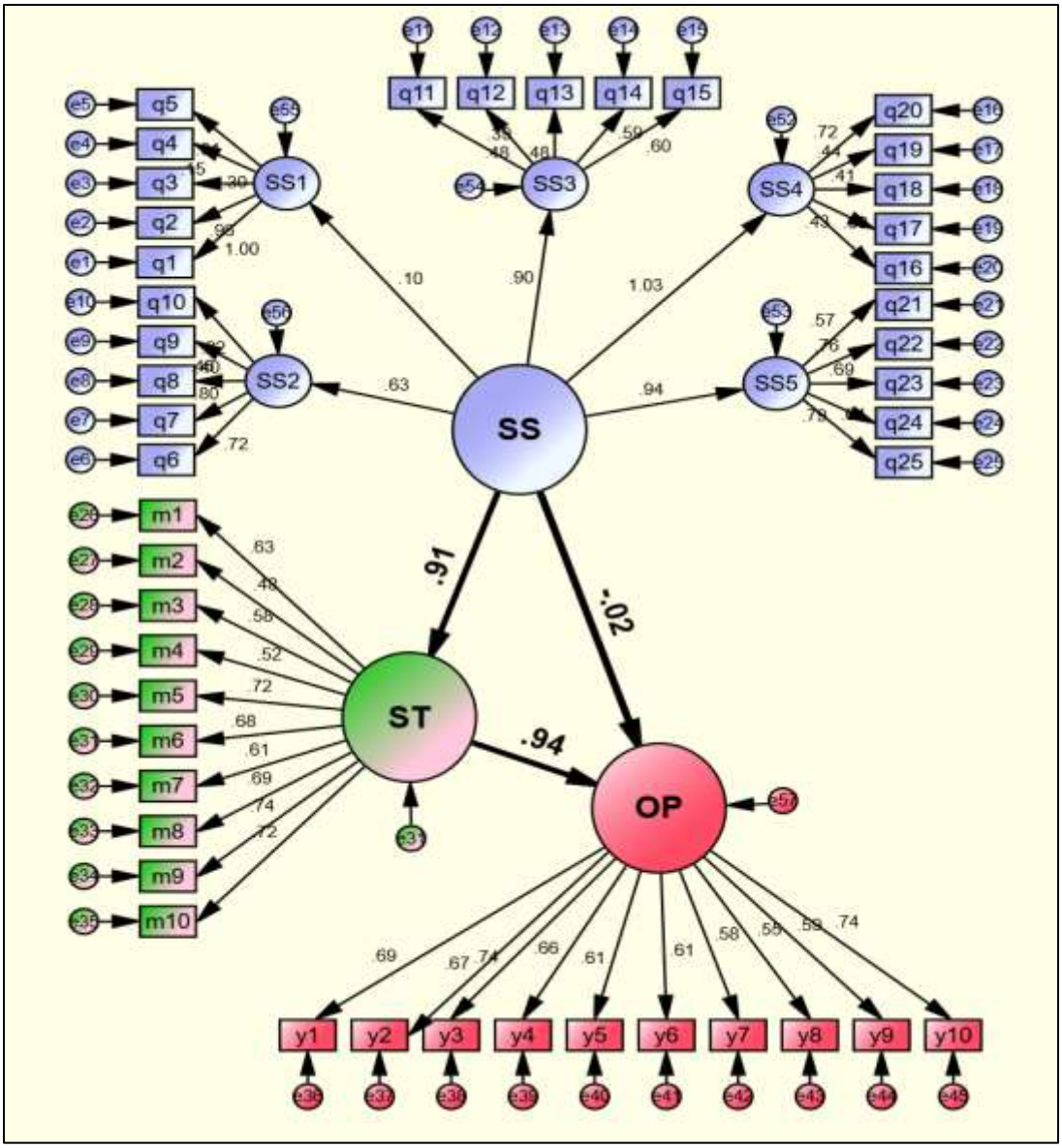

Figure 7. Structural Model

Discussion

The study aims to identify the extent to which the six sigma concepts are used to reduce the risk of errors and eliminate differences using strategic thinking. It also aims to develop the effectiveness of services, especially within the time,. Several studies have shown that there is great importance in adopting strategic thinking in improving the quality of outputs (Liang, 2007). As of the above illustrations it is clear that not much research has been done on the six sigma analysis since there is a lack of tangible framework classifying past efforts and guiding future research as well. However, based on the information present, it is observed that the six sigma tool is vital not only for the tourism industry but also for all the sectors that seek to minimize the defects. It is a vital tool as long as the service is concerned; six sigma has positively affected the

operational performance through the above dimensions that have been discussed and the tool is recommended for all the industries that haven't embraced it.

The result proved that there is a need to employ six sigma techniques to improve operational performance, this result is in line with the results of Parast, 2011 that shows the weakness in the degree of using the scientific method in measuring indicators of improving the overall quality in the departments, development in quality activities in the tourism companies that were included in the study. The results of the study indicates that strategic thinking contributes to supporting management capabilities to improve performance, and several studies such as (Casey & Goldman, 2010) have indicated that strategic thinking is an important factor for management to support strategic capabilities. The results also indicated that focusing on customers' needs, strategic thinking is an important factor in identifying future actual needs. Also the study concluded that strategic thinking supports the infrastructure, training, and efficiency (Goldman, 2015). In addition, strategic thinking supports continuous improvement, which is reflected positively in performance and this result is in line with Self et al., 2015 which indicates that strategic thinking contributes to improving performance.

Conclusion

The study proved that employing strategic thinking as a mediator contributes to improving the operational performance of tourism companies with the dimensions of management support, focus on the customer, infrastructure, training and competency, continuous improvement. The study also showed that six sigma in the tourism sector has a significant impact on enhancing the level of quality of services that must meet the needs and expectations of customers.

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