Statistical Analysis on Annual Expenditure of Tourism

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Abstract

In today's world, the International Tourism Sector is humongous increasing day by day by from various nations. There is still a significant issue of informed decisions(Decisions making Process) and economic uncertainty of international guests impacts severely on annual tourism revenue. To reduce this problem, we focus on to show the results of the yearly statistical Analysis of International Tourism Expenditure. For the analysis, we consider the annual tourism dataset of Switzerland. Moreover, we performed ONE-way ANOVA, and Two Way ANOVA tests to show a detailed statistical sketch of International tourism using IBM SPSS and questionnaire. The conclusions of Analysis will not only help to visitors but also beneficial for residents to improve business revenue of International tourism.

1 Introduction

In many nations, the international tourism sector popular every day. The statistical analysis for international tourism helps to improve market growth and business revenue. The Ongan([1],2018) introduced the annual tourism demand analysis on Japanese tourists who travel to the US. The objective is to reduce issues on economic uncertainty of Japanese tourists using unit root and the cointegration tests and Japanese consumers dataset from 1996 to 2015. Moreover, the author proposed an empirical model with logarithmic equations to calculate the error term and show hypothesis. Finally, The test results depict the 1% significance level with a null hypothesis and improvement in the level of uncertainty Index. According to the Ovcharov ([2],2015), the three-factor additive model helps to improve tourism expenditure in Russia. It aims to focus on the enhancement of International tourism ratio using statistical analysis of Russia tourism dataset. Also, the author analyses various critical metrics in Russia tourism from 2007 to 2013 and state problems.

Some researchers already performed an Analysis of variance tests and analysed results using IBM SPSS. In context, the Lemenkova ([3],2019) presents a geostatistical analysis of philippine archipelago by using IBM SPSS. Also, a statistical sketch of One-way ANOVA test for computation of geological modelling. It includes an evaluation of different geological samples with a sum of square, Mean square and df. Overall, The statistics results show the variations in the spatial variability of geological parameters. Moreover, Xin Liu([4],2018) states the statistical analysis for the impact of simulated acid rain on a Chinese fir in southern china. The analysis aims to focus evaluation of the effects of

acid rain growth rates, S/N ratio and pH by using Two-way ANOVA test and SPSS. The final results show the significant variances in the above parameters.

In this report, we show an annual statistical analysis of International tourism in Switzerland. For the same, we perform One-way ANOVA and Two-way Anova using annual tourism dataset of Switzerland. Moreover, for evaluation of dataset, we use IBM SPSS tool developed by Pallant([5]) We specifically consider variables such as Arrivals from abroad, Gender, ageGroup and Travel expenditure from Switzerland dataset. In this report,These variables we consider by using the following tests

- **One-Way ANOVA** It referred to as Analysis of variance aims to focus on the comparison of two or more distinct groups to assess whether statistical proof exists that the related population means are substantially different.To find the average mean value, we consider Arrivals from abroad expenditure as a dependent variable and Gender as an Independent variable.

- **Two-Way ANOVA** It referred to as an extension of One-way ANOVA aims to focus on mean differences in comparison and interaction between two or more distinct groups knows as factors.To find how the total average of arrivals from abroad per age group and Gender, we consider Total tourism expenditure as a dependent variable and gender and age group as an Independent variable.

1.1 Research Design and Data Collection

The dataset collected from Quandl, which includes annual yearly basis information of international tourism of Switzerland from 1963 to 2019.[1] The data is in CSV format import on IBM SPSS Statistics 26 becomes sav. The following table shows the column names of both datasets.

Column	Description
1	Date
2	Arrivals guest from swiss
3	Arrivals from abroad
4	Arrivals total
5	OvernightStays total
6	OvernightStays Guest from abroad
7	OvernightStays Guest from US
8	OvernightStays Guest from India
9	OvernightStays Guest from Japan
10	OvernightStays Guest from Germany
11	OvernightStays Guest from Italy
12	OvernightStays Guest from France
13	OvernightStays Guest from UnitedKingdom
14	Tourism Expenditure in the Country
14	Sex
15	AgeGroup

Table 1: Structure of Switzerland Data

[1] `https://www.quandl.com/data/SNB/CONTOURISMA-Tourism-in-Switzerland-Annual`

2 Descriptive Analysis

In this, we mainly focus on showing mean, variance and standard deviation for Independent variable Gender on dependent variable total Arrivals from abroad to compare mean value. We consider specific these two variables from the dataset of Switzerland because it contains annual information help to understand and determine it's reasonable for homogeneous variances.For that, we need a Hypothesis

2.1 Hypothesis

Null-H0: Total Arrivals mean value is more than Gender.
Alternative-H1: Gender mean value not more than total arrivals.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
ArrivalsGueststromabroad	56	6541.034	10485.197	7674.22764	916.654232	840254.980
Sex	55	0	2	.84	.764	.584
Valid N (listwise)	55					

Figure 1: Descriptive Analysis

The above figure1 shows the total value of N for two variables. It also shows the maximum,minimum,mean standard deviation and Variance value of arrivals is higher than Gender value.

According to Kim([6],2018) The variance of homogeneity tests, such as the Levene's test, is sufficient as gatekeepers to determine whether to use the ANOVA procedure or not on a dataset. Also, the results of the test help to understand whether considered factors are violated or not for the ANOVA test.

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
ArrivalsGueststromabroad	Based on Mean	.034	2	52	.967
	Based on Median	.010	2	52	.990
	Based on Median and with adjusted df	.010	2	48.604	.990
	Based on trimmed mean	.001	2	52	.999

Figure 2: Leven's Test Analysis

The **Leven's test** referred as ANOVA f-test on the absolute deviations of the sample scores from the samples mean to assess variance inequality across the groups as well as sample median which tests for variance differences across the groups.[6] From the above results 2 depicts that the significant value p=0.967 is higher than 0.05 for types of genders groups *(0=male,1=female and 2= others)*. Hence, **f-test statistics mean**

F(2,52)=0.034,**P**=0.967 with H0 is reasonable for assumptions of homogeneity of variance.

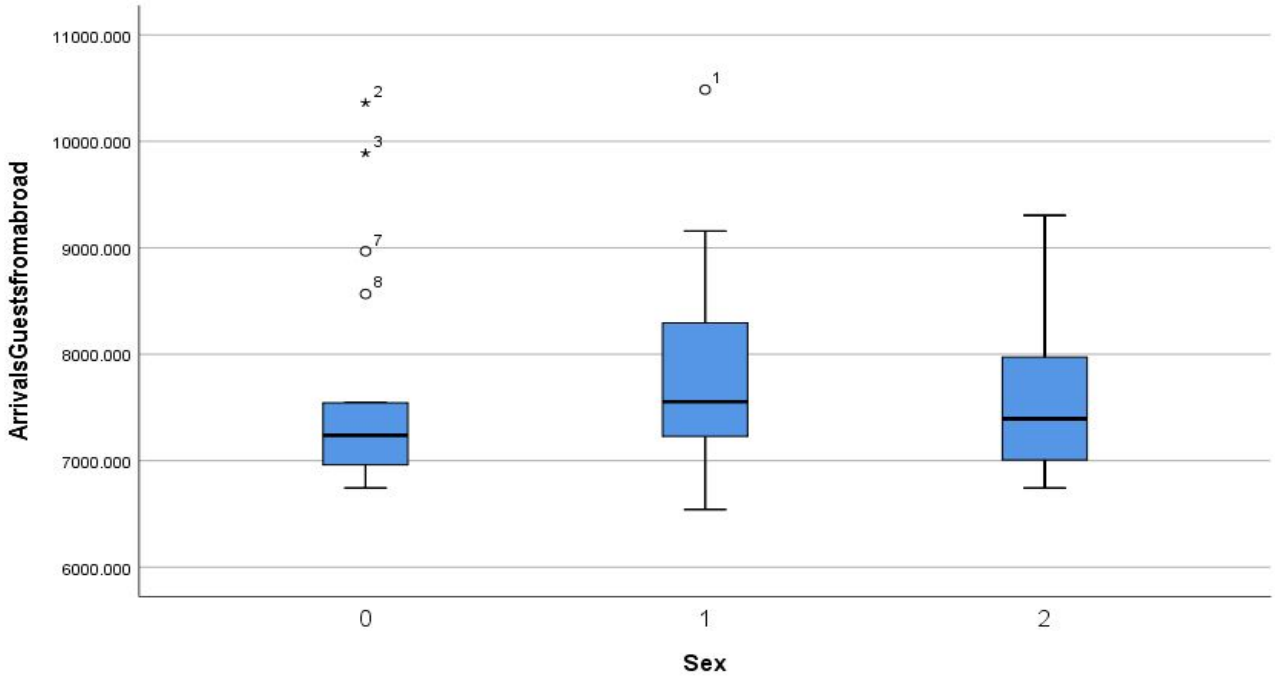

Figure 3: Simple Boxplot of distributions

The above boxplot 3 as a visualisation method plots the distributions of 3 types of Genders as per total arrivals from abroad ranges from 6000 to 11000 for assumptions of homogeneity of variance. Also, type 2 gender arrivals from abroad in Switzerland is travelling more compared to commons sex(male and female) guests.

2.1.1 Benefits

- The above descriptives and Levene's test analytics will help to improve reputations management and strategic marketing of tourism in Switzerland.
- Overall will Increase business revenue and customer experinces in toursim of Swiss.

2.1.2 Conclusion

In terms of significant value P greater than 0.05 proves the null hypothesis accepted for the mentioned factors. Also, It's clear that these variables are suitable for ANOVA test or Homogenpous of variances. Moreover, Visualizations shows Arrivals of type 2 genders are keen on travelling abroad

3 One-way ANOVA

3.1 Research Question

What category of people keen on travel abroad? Do the average arrivals from abroad significantly differ by Sex(males, females, and others)?

In this analysis, arrivals from abroad are continuous, and types of Gender is categorical. The main **objective** of the One-way ANOVA test is specifically using the above variables to find significant differences in annual tourism of Swiss.

3.1.1 Hypothesis

Null-H0: The average of Arrivals of abroad as per genders is same.
Alternative-H1: The average of Arrivals of abroad as per genders is different.

3.2 Statistical results analysis

Oneway

Descriptives

ArrivalsGueststromabroad

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
0	21	7583.72710	1007.511671	219.857071	7125.11328	8042.34091	6744.000	10362.010
1	22	7791.00750	897.789898	191.409449	7392.94976	8189.06524	6541.034	10485.197
2	12	7627.69283	877.792103	253.396753	7069.97034	8185.41533	6744.000	9304.633
Total	55	7676.23178	924.979008	124.724144	7426.17493	7926.28863	6541.034	10485.197

Figure 4: Descriptive Analysis of Swiss Dataset

The above figure 4 aims to focus on showing average detail analysis includes the mean and standard deviation of all Gender types as per arrival guests from abroad based on 95% confidence interval for the mean. The **purpose** of conducting this descriptive analysis is to understand the incremental and market growth of swiss tourism. Also, it will help to for market research for the development of the tourism sector in Swiss.

ANOVA

ArrivalsGueststromabroad

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	497788.053	2	248894.026	.283	.755
Within Groups	45703864.82	52	878920.477		
Total	46201652.87	54			

Figure 5: Findings of ANOVA

The **Objective** is to examine Significant value. The ANOVA Analysis in the above figure 5 shows the significant value p=0.755, which is higher than 0.05. Hence, Null Hypothesis H0 is accepted, and H1 alternative rejected. Also, it overall states that there is no significant difference in means of Arrival guests from abroad and types of genders.

Post Hoc Tests

Multiple Comparisons

Dependent Variable: ArrivalsGueststsfromabroad

	(I) Sex	(J) Sex	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tukey HSD	0	1	-207.280405	286.014487	.750	-897.31758	482.75677
		2	-43.965738	339.259089	.991	-862.46058	774.52911
	1	0	207.280405	286.014487	.750	-482.75677	897.31758
		2	163.314667	336.443612	.879	-648.38757	975.01690
	2	0	43.965738	339.259089	.991	-774.52911	862.46058
		1	-163.314667	336.443612	.879	-975.01690	648.38757
Bonferroni	0	1	-207.280405	286.014487	1.000	-914.85085	500.29004
		2	-43.965738	339.259089	1.000	-883.25786	795.32638
	1	0	207.280405	286.014487	1.000	-500.29004	914.85085
		2	163.314667	336.443612	1.000	-669.01225	995.64159
	2	0	43.965738	339.259089	1.000	-795.32638	883.25786
		1	-163.314667	336.443612	1.000	-995.64159	669.01225

Figure 6: Findings of Post-Hoc Tests

The Yu ([7],2006) conducted the Post-Hoc Analysis with the Scheffe test to examined the International tourists travel experience of Mongolia. It includes significant differences in satisfaction levels. The test results help to promote Mongolian Tourism.

The above figure 6 shows the results of Post-Hoc Analysis with Tukey HSD and Bonferroni on continues and categorical variables. The **purpose** of these tests identify significant differences and multiple comparisons of Gender types in deep and use to the enhancement of decision making for the tourism sector of Switzerland.

The results show a mean difference and Significant value of the Bonferroni test is higher than Tukey HSD test.Also other values like Lowebound and upper bound is higher in Bonferroni test. The findings of significant value are higher than 0.05, so it again proves than null hypothesis accepted.

The **benefits** of this test to Switzerland Tourism Authority is it will helps to improvement in transportation services and facilities like add more flights and maintenance of Switzerland as an adventure and ecotourism destination.

The Homogeneous Subsets depicts 7 the means of groups of both variables. The purpose of this subsets is same as Post-hoc test.Also, it shoes overall significant value is 0.796 which high than apha 0.05. We again cross checked value of N which is same as descriptives types of genders. Overall, Null hypothesis H0 clearly accepted from the results of all tests and alternative Hypothesis H1 is rejected.

The Following **Plot 8** visual representation shows the means of arrivals guests from abroad for all types of genders. The Arrival Males ratio steadily increases up to 7700 from overseas, where female arrivals ratio remains constant in 7700. Subsequently, Others

arrivals types of genders rate dramatically drop in Switzerland.

Homogeneous Subsets

ArrivalsGuestsfromabroad

	Sex	N	Subset for alpha = 0.05
			1
Tukey HSD[a,b]	0	21	7583.72710
	2	12	7627.69283
	1	22	7791.00750
	Sig.		.796

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 17.006.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Figure 7: Caption

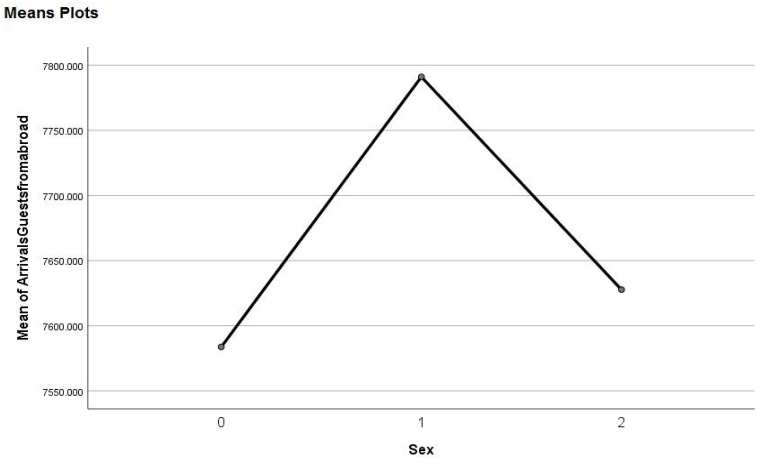

Figure 8: Plots of Means of all Arrivals form abroad

Also, from all the above tests we know the all means are sigificantly different. We need to calculate the Efective Size of One-Way ANOVA test by using Eta Squared to know the results is exactly significant or not.Pallant([5]). For the same we need to use the results of ANOVA Test from figure 5

Eta-Squared = Sum of squares between groups/ Total sum of squares
= 497788.053/46201652.87 = **0.010**

According to Pallant ([5]) If the Eta-squared results have three different scenarios, the small effect value is 0.01, and medium effect value is 0.06, whereas the large effect value is 0.14. So the Eta-Squared value is 0.010 which is less than 0.14 hence the results shows **medium effect**.

3.3 Benefits

- Improve Productivity of Tourism
  The multiple comparisons of different Post Hoc tests conclusions will enhance the tourism sector of Switzerland.

- Enhancement in Customer Experience
  The Significant mean differences from One-Way ANOVA will reduce uncertainty of Travellers

3.4 Conclusion

Statical Analytics helps tourism sector to makes proper decisions making process and improve business revenue. We showed significant differences in mean values results using One-Way ANOVA test. Also, we successfully conducted a Post Hoc test analysis with multiple comparisons using Tukey HSD and Bonferroni test. Moreover, The graphical representation also shows genderwise arrivals ratio difference. There is no significant difference between arrivals and genders.Most males and females travels more abroad, Overall, All the above tests results are higher than 0.05. So the Null hypothesis accepted.

4 Two-way ANOVA

4.1 Research Question

Is there a difference in the Total Tourism Expenditure(US$) in Country of all types of genders(male, female and Others) who fall into different age groups?

In this analysis, we have one dependent variable (i.e., Tourism Expenditure(US$)) and two independent variables (i.e., gender and age groups). The questions address the 2*3 factorial of ANOVA includes the **purpose** is to find an interaction between two independent variables on a single dependent variable. We specifically consider tourism expenditure as a dependant variable to examine the hypothesis and mean value difference.

4.1.1 Hypothesis

Null-H0: Total Tourism Expenditure mean value is more than Genders and Age Gropus.
Alternative-H1: Genders,Age Groups mean value not more than total tourism Expenditure.

4.2 Results of analysis

In this section We show detailed Analysis of Two-Way test with it's conclusions.The Analysis results will help to improve tourism sector of Switzerland.

The Ferrer-Rosell ([8],2015) introduced the (MANOVA) multiple analysis of variance model aims to focus on show statistical analysis for the log ratio of tourism expenditure using SPSS.

The following figure 9 depicts Descriptive analysis includes a difference in mean, Standard deviation of two Independent variables (Sex and Age Groups). The **goal** of this descriptives is to examine the mean values and how significantly different from between two variables.

Dependent Variable: TourismexpendituretheinthecountryUS$Mncountry

Sex	AgeGroup	Mean	Std. Deviation	N
0	Adolescence	484.50	107.634	4
	Childhood	418.50	75.660	2
	Maturity	446.00	52.261	6
	Newborn	263.50	23.335	2
	Old age	578.00	.	1
	Senior	483.00	.	1
	Youth	335.20	83.197	5
	Total	415.00	104.023	21
1	Adolescence	462.00	.	1
	Maturity	380.50	100.547	4
	Newborn	414.67	107.946	3
	Old age	517.25	213.790	8
	Senior	315.50	96.874	2
	Youth	350.25	82.815	4
	Total	427.18	158.483	22
2	Adolescence	483.50	.707	2
	Childhood	420.00	.	1
	Maturity	422.00	56.569	2
	Old age	523.00	401.986	3
	Youth	329.50	79.333	4
	Total	426.50	194.801	12
Total	Adolescence	481.00	76.570	7
	Childhood	419.00	53.507	3
	Maturity	420.17	72.293	12
	Newborn	354.20	113.215	5
	Old age	523.75	242.414	12
	Senior	371.33	118.509	3
	Youth	338.08	75.317	13
	Total	422.38	146.764	55

Figure 9: Descriptive Analysis of Independent Variables

The following figure10 states analysis of Leven's test of equality of error variances on dependent variable Total Tourism expenditure in Country (US$). The **purpose** of Leven's test of equality error is to examine the Significant value which is less than 0.05, so the null hypothesis is rejected.

Levene's Test of Equality of Error Variances[a,b]

		Levene Statistic	df1	df2	Sig.
TourismexpendituretheinthecountryUS$Mncountry	Based on Mean	3.044	13	37	.004
	Based on Median	.593	13	37	.844
	Based on Median and with adjusted df	.593	13	6.807	.802
	Based on trimmed mean	2.568	13	37	.012

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Dependent variable: TourismexpendituretheinthecountryUS$Mncountry

b. Design: Intercept + Sex + AgeGroup + Sex * AgeGroup

Figure 10:

The **figure 11** presents the tests of subjects the effects of the dependent variable on Total Tourism expenditure in Country (US$).The **goal** for the subject effects test is to examine the column **partial effective size eta squared**. It evidently show the eta squared value for Genders is 0.004 and for Age groups is 0.204. Additionally, The Total value for dependent variable is 10975497.00 and corrected total is 1163144.982.

The Nickerson ([9],2016) presents multiple analysis of variance referred to as MANOVA and Bonferroni post hoc analysis on sustainable geotravelers expenditure of Montana, USA using SPSS. The results show there no significant difference in geotraveler segments. The following **figure 12** states the post hoc test analysis with Tukey HSD test of Independent Variable Age Groups. The aim to show Multiple comparisons between Mean

Tests of Between-Subjects Effects

Dependent Variable: TourismexpenditureinthecountryUS$Mncountry

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	331974.265[a]	17	19527.898	.869	.610	.285
Intercept	5903576.746	1	5903576.746	262.801	.000	.877
Sex	3749.801	2	1874.901	.083	.920	.004
AgeGroup	212695.987	6	35449.331	1.578	.181	.204
Sex * AgeGroup	59241.173	9	6582.353	.293	.972	.067
Error	831170.717	37	22464.073			
Total	10975497.00	55				
Corrected Total	1163144.982	54				

a. R Squared = .285 (Adjusted R Squared = -.043)

Figure 11: Caption

values and help to improve the performance of the Tourism Sector.There is a significant differences in means between Adolescence and Old age groups, whereas Childhood, Maturity,Newborn and Senior age groups are Negative or small. As we can see, the significant value is greater than 0.05, so the null hypothesis is accepted.

Multiple Comparisons

Dependent Variable: TourismexpenditureinthecountryUS$Mncountry

	(I) AgeGroup	(J) AgeGroup	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tukey HSD	Adolescence	Childhood	62.00	103.427	.996	-260.28	384.28
		Maturity	60.83	71.282	.977	-161.29	282.95
		Newborn	126.80	87.761	.774	-146.67	400.27
		Old age	-42.75	71.282	.996	-264.87	179.37
		Senior	109.67	103.427	.936	-212.62	431.95
		Youth	142.92	70.265	.412	-76.03	361.87
	Childhood	Adolescence	-62.00	103.427	.996	-384.28	260.28
		Maturity	-1.17	96.747	1.000	-302.64	300.30
		Newborn	64.80	109.457	.997	-276.27	405.87
		Old age	-104.75	96.747	.929	-406.22	196.72
		Senior	47.67	122.377	1.000	-333.66	429.00
		Youth	80.92	96.000	.979	-218.22	380.06
	Maturity	Adolescence	-60.83	71.282	.977	-282.95	161.29
		Childhood	1.17	96.747	1.000	-300.30	302.64
		Newborn	65.97	79.780	.981	-182.63	314.56
		Old age	-103.58	61.188	.625	-294.25	87.08
		Senior	48.83	96.747	.999	-252.64	350.30
		Youth	82.09	60.000	.815	-104.87	269.05
	Newborn	Adolescence	-126.80	87.761	.774	-400.27	146.67
		Childhood	-64.80	109.457	.997	-405.87	276.27
		Maturity	-65.97	79.780	.981	-314.56	182.63
		Old age	-169.55	79.780	.360	-418.15	79.05
		Senior	-17.13	109.457	1.000	-358.21	323.94
		Youth	16.12	78.872	1.000	-229.65	261.89
	Old age	Adolescence	42.75	71.282	.996	-179.37	264.87
		Childhood	104.75	96.747	.929	-196.72	406.22
		Maturity	103.58	61.188	.625	-87.08	294.25
		Newborn	169.55	79.780	.360	-79.05	418.15
		Senior	152.42	96.747	.698	-149.05	453.89
		Youth	185.67	60.000	.053	-1.29	372.64
	Senior	Adolescence	-109.67	103.427	.936	-431.95	212.62
		Childhood	-47.67	122.377	1.000	-429.00	333.66
		Maturity	-48.83	96.747	.999	-350.30	252.64
		Newborn	17.13	109.457	1.000	-323.94	358.21
		Old age	-152.42	96.747	.698	-453.89	149.05
		Youth	33.26	96.000	1.000	-265.88	332.40
	Youth	Adolescence	-142.92	70.265	.412	-361.87	76.03
		Childhood	-80.92	96.000	.979	-380.06	218.22
		Maturity	-82.09	60.000	.815	-269.05	104.87
		Newborn	-16.12	78.872	1.000	-261.89	229.65
		Old age	-185.67	60.000	.053	-372.64	1.29
		Senior	-33.26	96.000	1.000	-332.40	265.88

Based on observed means.
The error term is Mean Square(Error) = 22464.073.

Figure 12: Post-Hoc Analysis with Tukey HSD

The following **figure 13** post hoc analysis on different types of Genders shows mean difference and significant values. The purpose is to examine Mean square(error) value 22464.073 of Age groups, and Genders is different or same. The difference in mean values of sex groups where Tukey HSD and Fisher's Least Significant Difference(LSD) mean difference precisely the same.

Subsequently, We need to cross-check the Significant value by evaluating the Ho-

Sex

Multiple Comparisons

Dependent Variable: TourismexpenditureinthecountryUS$Mncountry

	(I) Sex	(J) Sex	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tukey HSD	0	1	-12.18	45.725	.962	-123.82	99.46
		2	-11.50	54.238	.976	-143.92	120.92
	1	0	12.18	45.725	.962	-99.46	123.82
		2	.68	53.788	1.000	-130.64	132.00
	2	0	11.50	54.238	.976	-120.92	143.92
		1	-.68	53.788	1.000	-132.00	130.64
LSD	0	1	-12.18	45.725	.791	-104.83	80.47
		2	-11.50	54.238	.833	-121.40	98.40
	1	0	12.18	45.725	.791	-80.47	104.83
		2	.68	53.788	.990	-108.30	109.67
	2	0	11.50	54.238	.833	-98.40	121.40
		1	-.68	53.788	.990	-109.67	108.30

Based on observed means.
The error term is Mean Square(Error) = 22464.073.

Figure 13: Post-Hoc Analysis with Tukey HSD and LSD

mogeneous Subset using Tukey HSD and Duncan on dependent variable Total Tourism expenditure in Country (US$) with two Independent variables (AgeGroup and Sex). The results show both tests have significant values is higher than 0.05, so H0 Null Hypothesis is accepted.

Homogeneous Subsets

TourismexpenditureinthecountryUS$Mncountry

	AgeGroup	N	Subset 1
Tukey HSD[a,b,c]	Youth	13	338.08
	Newborn	5	354.20
	Senior	3	371.33
	Childhood	3	419.00
	Maturity	12	420.17
	Adolescence	7	481.00
	Old age	12	523.75
	Sig.		.391
Duncan[a,b,c]	Youth	13	338.08
	Newborn	5	354.20
	Senior	3	371.33
	Childhood	3	419.00
	Maturity	12	420.17
	Adolescence	7	481.00
	Old age	12	523.75
	Sig.		.079

Means for groups in homogeneous subsets are displayed.
Based on observed means.
The error term is Mean Square(Error) = 22464.073.

a. Uses Harmonic Mean Sample Size = 5.586.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

c. Alpha = .05.

Homogeneous Subsets

TourismexpenditureinthecountryUS$Mncountry

	Sex	N	Subset 1
Tukey HSD[a,b,c]	0	21	415.00
	2	12	426.50
	1	22	427.18
	Sig.		.970
Duncan[a,b,c]	0	21	415.00
	2	12	426.50
	1	22	427.18
	Sig.		.825

Means for groups in homogeneous subsets are displayed.
Based on observed means.
The error term is Mean Square(Error) = 22464.073.

a. Uses Harmonic Mean Sample Size = 17.006.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

c. Alpha = .05.

Figure 14:

The Following **Profile Plot 15** Bar Chart visual representation shows the Estimated means of total Total Tourism expenditure in Country (US$) for all types of genders and Age Groups. The purpose of this bar chart is to examine graphically total tourism expenditure in Switzerland.The Travel expenditure of old age peoples(males, females and others) is significantly rising up to 570$, 505$ and520$ whereas Adolescence males and others remain constant on 480$. As compared to, there is revenue from childhood fe-

males. Besides, Youth peoples revenue very low under 350$ in Switzerland. Additionally, Estimated Revenue from Age groups Maturity, newborn and seniors slowly increase up to 470$.

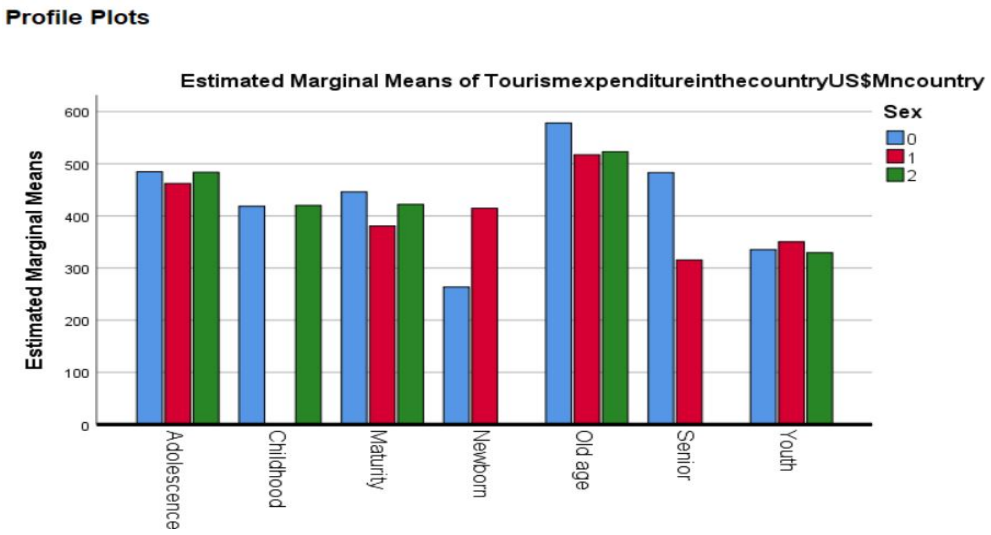

Figure 15: Profile plots Analysis

4.3 Benefits

Enhancement in Target Marketing :-The Multiple comparisons results will help to meet customer expectations and improve sustainable tourism market and Management.

4.4 Conclusion

We can conclude that there is no significant difference in multiple comparisons. The Old aged male,female and others spend more money on tourism as compared to others age groups. We successfully performed and gathered results from Two-Way ANOVA test. Additionally, We also examine results of The Post-Hoc analysis with Tukey HSD. Moreover, We cross-check means values and significance results with homogeneous subset. All test show significant value higher than 0.05, so the Null Hypothesis accepted. We have also shown the graphical analysis of Estimated tourism expenditure will help to improve the price model of Switzerland.

4.5 Final Conclusion and Discussion

Statistical data analytics plays a significant role in the Tourism sector. It will help to transform data into everyday tasks. In this report, we try to provide reliable solution on the decision-making process and reduce uncertainty on travellers by using analysis of variance technique such as One-Way ANOVA and Two-Way ANOVA or Multiple Analysis of Variance (MANOVA). We performed these two tests by considering different Independent and dependent variables and analyze results by showing graphically. The results 2 shown both tests accept the Null Hypothesis with a higher value than 0.05.Also, The Eta squared(Effective size) of One -way shows the medium effect as compared Partial Eta squared of Two-way shows tiny as per the actual difference in mean values. Besides,

the International Tourism expenditure is growing every year in Old Ages groups total 20-67% in Switzerland and a positive impact on tourism services.

Tests	Null Hypothesis	Alternative Hypothesis
Test of Homogeneous Variance	✓	—
One-Way ANOVA (F=0.283,p=0.755)	✓	—
Post-Hoc Tests(Tukey HSD,Bonferroni)	✓	—
Homogeneous Subsets	✓	—
Two-Way ANOVA (F=0.972,p=0.067)	✓	—
Leven's test of equality of error variances	—	✓
Post-Hoc Tests(Tukey HSD,LSD)	✓	—
Homogeneous Subsets	✓	—

Table 2: Hypothesis Results

The graphical representations **figure 16** of One-Way ANOVA Mean plots and Two-Way ANOVA Profile Plots show the One-Way is more productive than Two-Way.From the plots, we can see that most of the other types of genders keen to travel abroad from Switzerland whereas increase revenue from old age males whereas increasing revenue from old age males contrary to the downward trend in youth others.

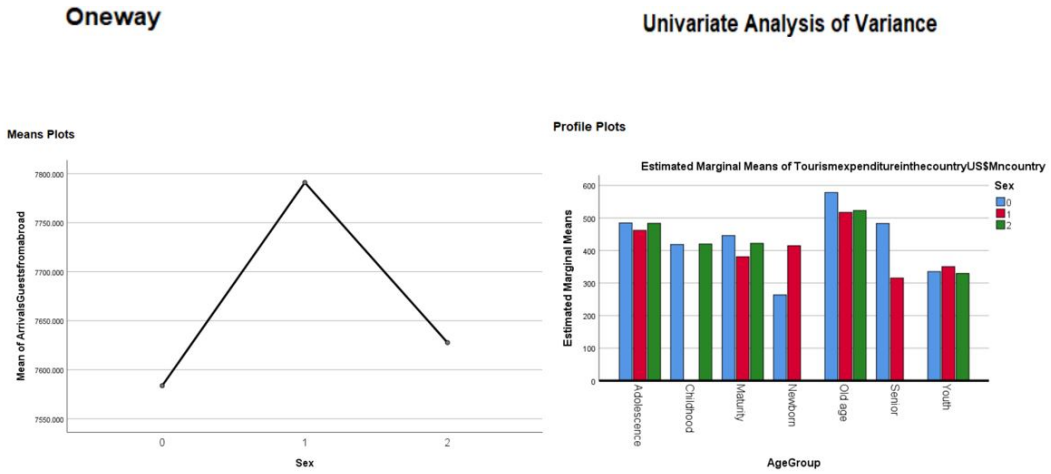

Figure 16: Plots Comparison

The Overall Analysis using IBM SPSS (Statistics 26) tool will be beneficial to Improve Tourism sector by reducing transportation cost, maintenance and increase Tourists satisfaction, Travel Experience and Revenue Management. The outcome is significant, as it reinforces the value of delivering a diverse, high-quality and innovative service by continually replacing existing facilities to the new one. As future work, we are planning to statistical analysis using Analysis of variance of different nations.

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