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A Study on Usage of Google Maps by Travellers in Madurai City

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Abstract **– Navigation tools are very many and they help in locating and covering place and distance. They are a guide in the land of journey. As inhabitants move from place to place for various reasons, civilizations have grown and complexities of routes have emerged due to thick population, men travel from place to place for work, and other important assignments. As the world shrinks more importance is attached to time. There is rush and bustle in activity wanting to reach unknown destinations, both by the drivers of the vehicle and by the travellers. This calls for use of technology in navigation. Google maps are a travel tool kit designed to identify destinations. It's usage in India and in Madurai by travellers is studied here.**

Keywords **– Google Maps, Travellers, Navigation, Compass, Android Phones.**

I. INTRODUCTION

Tools of navigation help in tracing traveller's destiny. Some of the many tools used for navigation are bond chronometer, by grave position line slide rule and so on. As travelling has increased and men move round the globe, it is important to cover distance and space without disturbing the other. The navigations tools used earlier are,

Bond Chronometer:

This timekeeper was the first American-made marine timekeeper taken to sea. William crunch bond, a 23-year-old boston clockmaker, crafted it during the war of 1812. This artefact is part of the national museum of American history's collection.

By Grave Position-line Slide Rule:

Celestial navigation requires complicated computations. Performing these calculations in cramped open cockpits with low temperatures and wind speeds of over 160 kilometers (100 miles) per hour was part of what made navigation difficult in the early years of aviation. Thankfully, Capt. L.C. Bygrave developed this handy slide rule computation at the time.

Sextant:

Navigating in the sea: this sextant was one of the navigation tools invented in the 18th century by british mathematical instruments makers that permitted mariners to find their position much better than ever before. The sextant became the most essential instrument for celestial navigation, used to find the angle of a celestial body above the horizon. Jesse ramsden, who made this sextant, also devised a machine to divide the scale on the sextant very precisely.

Apollo Sextant and Scanning Telescope:

Navigating in Space:

To determine position in space, an Apollo astronaut located a specific star using a single-power, wide-field telescope and then took a fix using a sextant. While this instrument does not look like a traditional sextant, the basic procedure is descended from centuries-old methods used by navigators at sea and in the air.

Dutch Pendulum Clock:

In the 17th century, several inventors were trying to make an accurate clock for finding longitude at sea. In purusuit of a sea clock, Christiaan Huygens, a dutch mathematician, changed timekeeping forever when he patented the first working pendulum clock in 1656 and later devised a watch regulator called a balance spring. Pendulum clocks immediately became the best timekeepers for use on land but they didn't work accurately on a heaving ship's deck. Huygens worked with several dutch clockmakers, including Johannes van ceulen who made this table clock around 1680. It is one of the earliest clocks with a pendulum.

Types of navigation equipment and resources used onboard modern ships.

Gone are the days when a ship navigation officer had to take help of unconventional ways to plan and navigate a voyage at sea. Today, a ship officer has myriad of marine navigation equipment which makes his life a lot simpler, thanks to the advancement in technology. Moreover, present-day seafarers are trained so as to know the functioning and operation of all modern day navigational equipment that has made the journey at sea smoother and safer.

Gyro Compass:-

It is used for finding the right direction. Unlike magnetic compass, gyro compass is not hampered by external magnetic field. It is used to find correct north position, which is also the earth's rotational axis. Its repeater system must be present in the steering platform for emergency steering.

Radar:-

It is used to determine the distance of the ship from land, other ships, or any floating object out at sea.

Magnetic Compass:-

The magnetic compass work in conjunction with the magnetic field of the earth. It is used to get planned direction for the voyage.

Auto Pilot:-

It is a combination of hydraulic, mechanical and electrical system and is used to control the ship's steering system from a remote location (Navigation bridge).

ARPA:-

Automatic Radar Plotting Aid displays the position of a ship and other vessels nearby. The radar displays the position of the ships in the vicinity and selects the course for the vessels by avoiding any kind of collision.

Automatic Tracking Aid:-

Just like ARPA, automatic tracking aid displays the information on tracked targets in graphic and numeric to generate a planned layout for a safer and collision-free course.

Speed & Distance Log Device:-

The device is used to measure the speed and the distance travelled by a ship from a set point. By calculating the same, ETA of the ship is adjusted or given to the port authority and agent.

Echo Sounder:-

This instrument is used to measure the depth of the water below the ship's bottom using sound waves.

Electronic Chart Display Information System:-

ECDIS is a development in the navigational chart system used in naval vessels and ships. With the use of the electronic chart system, it has become easier for a ship's navigating crew to pinpoint locations, and attaining directions are easier than before.

Automatic Identification System

AIS is a system which helps to pinpoint the location and other navigational statistics of ships. AIS uses VHF radio channels as transmitters and receivers to send and receive messages between ships which endeavours to fulfil a lot of responsibilities.

Long Range Tracking and Identification (LRIT) System

LRIT is an international tracking and identification system incorporated by the IMO under its SOLAS convention to ensure a through tracking system for ships across the world.

Rudder Angle Indicator

Rudder angle indicator, as the name indicates, provide the angle of the rudder. The display is provided on bridge to control the rate of turn and rudder angle of the ship.

Voyage Data Recorder

A VDR or voyage data recorder is an instrument safely installed on a ship to continuously record vital information related to the operation of a vessel. It contains a voice recording system for a period of at least 12 hours. This recording is recovered and made use of for investigation in events of accidents.

Rate of Turn Indicator

It indicates how fast the ship is turning at steady rate, normally shown as number of degree turned.

GPS Receiver

A global positioning system (GPS) receiver is a display system used to show the ship's location with the help of global positioning satellite in the earth's orbit.

Google maps among other navigation tools are widely used and is attempted for a detailed study here.

Google maps is a web mapping service developed by Google. It offers satellite Imagery, aerial photography, street maps, 360^{o} panoramic views of streets (street view), real-time traffic conditions (Google Traffic), and route planning for travelling by foot, car, bicycle and air or public transportation. In October 2004, the company was acquired by Google, which converted it into a web application. Google maps was launched in February

2005. The service's front end utilizes JavaScript, XML, and Ajax. Google maps offers an API that allows maps to be embedded on third-party websites, and offers a locator for urban businesses and other organisations in numerous countries around the world.

Google maps was first announced on the Google blog on February 8, 2005. In September 2005, in the aftermath of Hurricane Katrina, Google maps quickly updated its satellite imagery of New Orleans to allow users to view the extent of the flooding in various parts of that city. In October 2009, Google replaced Tele Atlas as their primary supplier of geo spatial data in the US version of Maps and used their own data.

On April 19, 2011, Map Maker was added to the American version of Google Maps, allowing any viewer to edit and add changes to Google maps. This provides Google with local map updates almost in real time instead waiting for digital map data companies to release more infrequent updates. In December 2012, the Google Maps application was separately made available in the App store, after Apple removed it from its default installation of the mobile operating system version Ios 6. On January 29, 2013, Google Maps was updated to include a map of North Korea.

On April 29, 2015, users of the classic Google Maps were forwarded to the new Google Maps with the option to revert removed from the interface. In 2016, the Government of South Korea offered Google conditional access to the country's geographic database - access that already allows indigenous Korean mapping providers high-detail maps. Google declined the offer, as it was unwilling to accept restrictions on reducing the quality around locations the South Korean government felt were sensitive.

In May 2018 Google announced major changes to the API structure starting June 11, 2018. This change consolidates the 18 different endpoints into three services and merges the basic and premium plan into one. A major consequence of this change is a 1400% price raise for users of the basic plan with only six weeks of notice. This sudden move caused a harsh reaction within the developer's community. In June, Google postponed the change date to July 16, 2018. In August 2018, Google maps designed its over-all view into a 3D globe dropping the Mercator projection, which was used to project the planet onto a flat surface. In January 2019, Google maps added speed trap and speed camera alerts as reported by other users.

Directions and transit-Google maps provides a route planner, allowing users to find available directions through driving, public transportation, walking or biking. Google has partnered globally with over 800 public transportation providers to adopt General Transit Feed Specification (GTFS), making the data available to third parties. Google Traffic offers traffic data in real-time, using a colored map overlay to display the speed of vehicles on particular roads. Crowdsourcing is used to obtain the GPS-determined locations of a large number of cell phone users, from which live traffic maps are produced.

Street view – On May 25, 2007, Google released Google Street View, a new feature of Google Maps which provides 360^{o} panoramic street-level views of various locations. On the date of release, the feature only included five cities in the US. It has since expanded to thousands of locations around the world. In July 2009, Google began mapping college campuses and surrounding paths and trails.

Business listings – Google collates business listings from multiple on-line and off-line sources. To reduce duplication in the index, Google's algorithm combines listings automatically based on address, phone number, or geocode, but sometimes information for separate businesses will be inadvertently merged with each other,

resulting in listings inaccurately incorporating elements from multiple businesses. Google allows business owners to verify their own business data through Google My Business, and has also recruited volunteers to check and correct ground truth data.

Indoor maps – In March 2011, indoor maps were added to Google Maps, giving users the ability to navigate themselves within buildings such as airports, museums, shopping malls, big-box stores, universities, transit stations, and other public spaces. Google encourages owners of public facilities to submit floor plans of their buildings in order to add them to the service.

Google Local Guides – Google local guides is a program launched by Google maps to enable its users to contribute to Google Maps and provide them additional perks and benefits for the work. The program is partially a successor to Google Map Maker as features from the former program became integrated into the website and app.

1.2. *Statement of the Problem*

Given the vintage of usage of google maps round the countries the researchers have envisaged its usage in Madurai city which is a tier II city in the state of Tamil Nadu in India.

1.3. *Objectives of the Study*

1) To identify the awareness and usage pattern of Google maps among business travellers in Madurai city.
2) To find the extent of satisfaction towards usage of Google maps in Madurai city.
3) To understand the problems involved in usage of Google maps in Madurai city.
4) To offer suggestion, based on the present study.

1.4. *Scope of the Study*

The scope of the study is to identify the usage of Google Maps by travellers in Madurai city. The study encompasses the level of satisfaction among the travellers in using Google Maps.

1.5. *Framework of Analysis*

Data is divided into primary and secondary data. Primary data is collected through well-structured questionnaire and secondary data, from e-books, e-journal and websites.

1.6. *Sample Size and Sample Design:*

Data had been collected from 100 respondents based on convenient sampling.

In this study the following tools are used to analysis the data.

1) Percentage analysis.
2) Garrett ranking technique.
3) Weighted average method.

1.7. *Hypothesis*

The null hypotheses, used for analysis are

a) There is no significance relationship between occupation and purpose of using Google maps.

b) There is no significance relationship between occupation and usage of Google map in a week.

c) There is no significance relationship between qualification and mode of service.

1.8. *Age Wise Classification of the Respondents*

Age is the period of human life marked by mental or physical development. The age of the respondents is considered to be a useful demographic variable to categorize respondents into different segments. Hence age is one of the influencing factor to be considered in this study in order to know which age group of respondent's preference toward Google maps. Table 1 shows the age wise classification of the respondents.

Table 1. Age Wise Classification.

Age		Frequency	Percent
Valid	20-30 yrs	58	58
	31-40 yrs	26	26
	Above 40 yrs	16	16
	Total	100	100

Source: Primary Data

Table 1 shows that the 58% of the respondents fall under the age group of 20-30, 26% of the respondents fall under the age group of 31-40, 16% of the respondents fall under the age group of above 40.

1.9. *Gender Wise Classification of the Respondents*

Gender is a very important and useful dividing variable to classify the respondents. It is the relationship between men and women, both perceptual and material. Men and women act differently in using mobiles. Table shows the Gender wise classification of the respondents.

Table 2. Gender Wise Classification.

Gender	Frequency	Percent
Male	76	76
Female	24	24
Total	100	100

Source: Primary data.

Table 2 shows that among 24%of the respondents are female and 76% of the respondents are male.

1.10. *Classification on the Basis of Occupation*

The nature of occupation of readers generally influences the preference and behaviour of the respondents. Occupation as a variable in this study is taken in order to know the comparative study on customers' satisfaction towards Google maps. Table.3 presents the occupation wise classification.

Table 3. Occupation Wise Classification.

Occupation	Frequency	Percent
Driver	32	32
Salesman	24	24
Others	44	44
Total	100	100

Table 3 shows that the 32% of the respondents are driver, 24% of the respondents are salesman, 44% of the respondents are others.

1.11. *Classification on the Basis of Educational Qualification*

The respondents were classified on the basis of the education. Education is important to moulding one's attitude towards various aspect of life. Table4 presents the education wise classification.

Table 4. Educational Qualification Wise Classification.

Education	Frequency	Percent
10&HSC	24	24.0
UG	47	47.0
PG	20	20.0
Others	9	9.0
Total	100	100.0

Source: Primary Data.

Table 4 shows that the 24% of the respondents have completed 10^{th} and HSC, 47% of the respondents have completed Under Graduation, 20% of the respondents have completed Post Graduation, 9% of the respondents have completed other type of qualification.

1.12. *Classification on the Basis of Purpose of using Google Maps*

Respondents were classified on the basis of using Google map for various purposes. The travellers may use Google map for verify the directions, predict distance correctly. Some respondents use Google map to visit various places for children's vacation. And some respondents may use Google map to find postal code of an address. Table 5 shows the classification on the basis of using Google map for various purposes.

Table 5. Purpose Wise Classification.

Purpose	Frequency	Percent
Direction	48	48.0
Distance	15	15.0
Vacation	22	22.0
Postcode	15	15.0

Purpose	Frequency	Percent
Total	100	100.0

Source: Primary Data

Table 5 shows that the 48% of the respondents use Google map to find direction, 15% of the respondents use Google map to find distance, 22% of the respondents use Google maps to find place for vacation, 15% of the respondent use Google map to find post code address.

1.13. *Classification on the Basis of Using Smart Phone:*

The respondents are mostly using smart phones now-a-days, but still some are not using smart phones because of unawareness. The drivers and salesman who are above the age of 50 years are not able to continue in these categories of work because of their health conditions. Table 6 shows the classification on the basis of using smart phone.

Table 6. Classification on the basis of using smart phone.

Smart Phone	Frequency	Percent
Yes	100	100.0
No	0	0
Total	100	100.0

Source: Primary Data.

Table 6 shows 100% of the respondents are using smart phone.

1.14. *Classification on the Basis of Mobile Operating System:*

The respondents are classified on the basis of various mobile operating system. There are various operating system in mobile phones, the model of the phone are become upgrading day to day. In this study the three category of mobile phones namely Android mobile, Microsoft phone and i-phone are taken. Table 7 shows the classification on the basis of model of the phone.

Table 6. Classification on the basis of mobile operating system.

Model of Phone	Frequency	Percent
Android	68	68.0
Microsoft	21	21.0
i phone	11	11.0
Total	100	100.0

Source: Primary Data

Table 3.7 shows the 68% of the respondents use Android phone, 21% of the respondents use Microsoft phone, and 11% of the respondents use i-phone.

1.15. *Classification on the basis of Period of Usage of Google Maps*

The respondents are classified on the basis of period of using a Google map in a week. The Drivers may use Google map for 24hrs a week because of their occupation. Some respondents may use more or less in a week. So, the table 8 shows the classification on the basis of using Google maps.

Table 6. Period of usage wise classification.

	Frequency	Percent
Below 24 HRS	35	35
24 HRS	30	30
Above 24 HRS	35	35
Total	100	100

Source: Primary Data.

Table 6 Shows the 35% of the respondents use Google map below 24 hrs, 30% of the respondents use Google map for 24 hrs, and 35% of the respondents use Google map for above 24 hrs.

1.16. *Classification on the basis of using Short Route*

The respondents are classified on the basis of using short route in Google map. Mostly the salesman use this short route to save their delivery time. Some respondents like drivers also use this short route method in Google map. Table 3.9 shows the classification on the basis of using short route in Google map.

Table 8. Classified as short route.

Route	Frequency	Percent
Yes	69	69
No	31	31
Total	100	100

Source: Primary Data.

Table 8 shows the 69% of the respondents use short route in Google map, and 31% of the respondents not use short route.

1.17. *Rating of Google Map*

The respondents are classified on the basis of rating a Google map. The respondents are rating the Google map like Very good, Good, Fair, Bad and Very bad. This rating is based on the usage of Google map by the respondents. Table 3.10 shows the classification on the basis of rating a Google map.

Table 9. Classification on the basis of rating a Google Map.

	Frequency	Percent
Very good	27	27
Good	54	54
Fair	15	15
Bad	3	3

	Frequency	Percent
Very bad	1	1
Total	100	100

Source: Primary Data.

Table 9 shows 27% of the respondents give rating of Google map as very good, 54% of the respondents give rating of Google map as good, 15% of the respondents give rating of Google map as fair, 3% of the respondents give rating of Google map as bad, 1% of the respondent give rating as very bad.

Table 10. By using the Garret ranking, we find the priority given by the respondents to find the location using Google maps.

S. No	Reasons	Number of Respondents								Total Score	Mean Score	Garret Rank
		1	2	3	4	5	6	7	8			
1.	To identify place of worship	16	15	23	7	12	11	4	12	5388	53.88	**I**
2.	To identify petrol/diesel station	10	19	12	17	13	13	11	5	5231	52.31	**II**
3.	To identify historical places	12	17	9	8	10	14	19	11	4919	49.19	**V**
4.	To identify tourist spots	15	13	12	7	8	9	15	21	4731	47.31	**VII**
5.	To identify hotel	14	8	19	14	11	10	8	16	5009	50.09	**IV**
6.	To identify airport	6	11	5	22	24	13	9	10	4801	48.01	**VI**
7.	To identify highways	19	9	8	11	13	16	17	7	5109	51.09	**III**
8.	To identify railway junctions	8	9	11	14	10	13	17	18	4527	45.27	**VIII**

Source: Primary Data.

1.18. *Problem Faced by the Users*

Problems in using Google Maps are not easy to operate, it is not simple it is not well tailored, net connection is not endurable, predicted places are not correct are faced by respondents. An attempt is made to find out problem faced by the respondents towards usage of Google Maps by using Weighted Average method.

Table 11.

S. No.	Problem Faced by the Users	No. of. Respondents					Total Weight	Weighted Average	Rank
		SA	A	N	DA	SDA			
1	Google maps are not easy to operate	50 (250)	---	10 (30)	20 (40)	20 (20)	340	22.67	VII
2	Google maps is not simple	70 (350)	10 (40)	5 (15)	10 (20)	5 (5)	430	28.67	IV
3	Google maps are not well tailored	67 (335)	8 (32)	---	5 (10)	15 (15)	392	26.13	V
4	Net connection is not endurable	82 (410)	8 (32)	10 (30)	---	---	472	31.47	I
5	Predicted places are not correct	75 (375)	10 (40)	3 (9)	2 (4)	10 (10)	438	29.2	III
6	Procedure of Google map is not easy for you	80 (400)	10 (40)	7 (21)	---	3 (3)	464	30.93	II

S. No.	Problem Faced by the Users	No. of. Respondents					Total Weight	Weighted Average	Rank
		SA	A	N	DA	SDA			
7	Google maps is not time consuming	61 (305)	7 (28)	5 (15)	12 (24)	13 (13)	385	25.67	VI
8	Utility of Google maps is very low	30 (150)	---	---	50 (100)	20 (20)	270	18	VIII

Source: Primary Data.

Table 12 shows the Problem faced by users by using a Google Map. Weighted Average is used to know the Problem faced by users. Net connection is not endurable is ranked as First. Procedure of Google map is not easy is ranked as Second. Predicted places are not accurate is ranked as Third. Usage of Google map is not simple is ranked as Fourth. Google maps are not well tailored is ranked as Fifth. Google maps is time consuming is ranked as Sixth. Google maps are not easy to operate is ranked as Seventh. Utility of Google maps is very low is ranked as Eighth.

Testing of Hypothesis

There is no significance relationship between Occupation and Purpose of using Google maps.

Table 12. Correlation between occupation and purpose of using Google Maps.

		Occupation of the Candidate	Use of Purpose
Occupation of the candidate	Pearson Correlation	1	.229*
	Sig. (2-tailed)		.022
	N	100	100
Use of purpose	Pearson Correlation	.229*	1
	Sig. (2-tailed)	.022	
	N	100	100

Output gives the Pearson correlation coefficient. The Pearson correlation (r) value is 0.229. Since the r value is positive and significance two-tailed value is 0.022 which is less than 0.05, so we reject the null hypothesis and there is correlation between Occupation and Purpose of using Google maps.

There is no significant relationship between Occupation and Usage of Google maps in a week.

Table 13. Regression between occupation and usage of Google Maps in a week.

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.057	1	.057	.075	.785b
	Residual	74.503	98	.760		
	Total	74.560	99			

a. Dependent Variable: occupation of the candidate.

b. Predictors: (Constant), Period of usage.

Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	2.063	.226		9.131	.000
	Period of usage	.029	.104	.028	.274	.785

a. Dependent Variable: occupation of the candidate.

The F ratio is 0.075 the P value is 0.785 which is greater than 0.05. So Null hypothesis is accepted. Therefore there is no significant relationship between the occupation of the respondents and the period of using Google maps.

There is no significance relationship between Qualification and Mobile Operating System.

Table 14. Relationship between qualification and mobile operating system.

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	Sig.
1	Regression	3.272	1	3.272	7.416	.008[b]
	Residual	43.238	98	.441		
	Total	46.510	99			

a. Dependent Variable: Model of phone.

b. Predictors: (Constant), Qualification of the candidate.

Coefficients						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	.992	.174		5.697	.000
	Qualification of the candidate	.205	.075	.265	2.723	.008

a. Dependent Variable: Model of phone.

The F ratio is 7.416, the P value is 0.008 which is lesser than 0.05. So we reject the Null Hypothesis. Therefore there is significant relationship between the Occupation of the candidate and the Mobile Operating System.

1.19. *Findings*

1. 58% of the respondents fall under the age group of 20-30.
2. 76% of the respondents are male.
3. 44% of the respondents are doing miscellaneous jobs.
4. 47% of the respondents have completed Under Graduates.

5. 48% of the respondents use Google map to find direction.
6. 100% of the respondents are using smart phones.
7. 68% of the respondents use Android phones.
8. 35% of the respondents use Google map for more than 24 hrs in a week.
9. 69% of the respondents use short route in Google maps.
10. 54% of the respondents give rating of Google map as good.
11. 98% of the respondents use Google map for navigation.
12. 85% of the respondents are says yes to accurate prediction of distance by google maps.
13. With regard to predict destinations correctly 74% of the respondents view that Google map can predict correctly.
14. Voice mode of Google map is clear for 77% of the respondents.
15. 77% of the respondents get connectivity.
16. 47% of the respondents said that Google map is Good.
17. The Garrett ranking method is used to know the purpose of using Google maps. To identify the place of workship is ranked as first. To identify Petrol/Diesel station is ranked as Second. To identify Highways is ranked as Third.
18. The weighted average method is used to know the problem faced by using a Google maps. Net connection is not endurable is ranked as first. Procedure of Google maps is not easy for you is ranked as Second. Predicted places are not correct is ranked as Third.
19. There is significance relationship between Occupation and Usage of Google Maps.

There is significance relationship between Qualification and Mobile Operating System.

II. CONCLUSION

This study is made an attempt to find out the usage of Google map by travellers in Madurai city. It is concluded that the usage of Google map is a new technology which is playing a vital role in identify the place with a limited time. With better use of technology and phones this navigation tool is set to set the stage in. It would develop into a smart tool customised over time and place, with many features. Google maps are unique and are expected to gain further usage round the globe especially in cities and for tourist purposes.

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Dr. Sr. Bindu Antony, Assistant Professor of the Research Centre of Commerce, Fatima College, Madurai is also the Vice Principal of Aided courses of the same college. She has a research bend of mind and is specialized in Human Resource Management. She has 9 years of teaching experience and has published more than 15 research articles. She has authored three books to the credit.