THE IMPACT OF GOOGLE MAPS APPLICATION ON THE DIGITAL ECONOMY

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Abstract

Google Maps is indispensable for helping tourists navigate Thailand, which is a popular tourist destination. It includes comprehensive maps, points of interest, and lodging, dining, and attraction recommendations. It contributes to Thailand's tourism industry's growth by enhancing the overall travel experience (Amornvivat et al., 2017; The Nation, 2023). This study explains the Google Maps application's impact on Thailand's digital economy. This research adopted interviews with six Google Maps consumers and six business owners. Content analysis and NVivo were used to analyse the data. The results show that the Google Map application simplifies locating businesses, making reservations, and placing orders for users. Additionally, Google Maps recommends nearby businesses that may interest the user based on their location and preferences. Through mobile commerce and local recommendations, it encourages users to explore new businesses and stimulates local spending. Google Maps has had a significant impact on the digital economy in Thailand. It helps businesses increase visibility, interact with customers, and attract foot traffic to their physical locations. It also facilitates mobile commerce, provides local recommendations, and aids the tourism industry. Google Maps contributes to digital domain economic growth, increased sales, and enhanced user experiences by connecting users with pertinent businesses and facilitating efficient navigation.

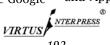**Keywords:** Google Maps, Digital Economy, Application, Economics, Tourism and Travel

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1. INTRODUCTION

In recent years, digital maps have emerged as an essential tool for navigation and exploration, enabling users to traverse the world with unparalleled ease and efficiency (Cheong, 2023). This online map application is built using the Google Maps API, Google Geocoder, Microsoft SQL database, Microsoft Aspx.NET, and Spry Framework for Ajax. Additionally, it is anticipated that the online mapping application is anticipated to be compatible with key web browsers such as Microsoft Internet Explorer (IE) 7.0+, Google Chrome, Mozilla Firefox, and Apple Safari (Hu & Dai, 2013). Google Maps has

revolutionised how individuals access and utilise digital maps for navigation purposes. Its advanced technology allows users to easily access online maps and obtain valuable trip information with minimal effort. Google Maps incorporates a variety of cutting-edge features, including satellite imagery, aerial photography, street maps, 360-degree panoramic views, and geographic information system (GIS) data, to provide up-to-date and comprehensive digital maps. These maps can be accessed via the internet, offering users the convenience of planning routes and navigating on foot, by car, bicycle, air, or public transit. Notable features of Google Maps include street view, turn-by-turn instructions, and public transit schedules, which contribute to its usefulness and user-friendliness. Furthermore, Google continuously updates the application, introducing new features and data to enhance its functionality and value. Recent updates have introduced a widget that allows users to view real-time traffic information from surrounding locations, even when the app is closed or the screen is locked. With its wide range of helpful features, frequent updates, and significant improvements, Google Maps has become an indispensable tool for modern-day travel, serving billions of people worldwide (Mehta et al., 2019; Wallis, 2022). Cities worldwide are facing an urgent transportation crisis due to the modern era's tremendous expansion in urban population and the number of private cars. Road traffic congestion is a persistent issue that causes delays, lost time, stress among people, energy use, environmental damage, etc. Simulating and optimising traffic control and enhancing traffic management are required to lessen traffic congestion. There are various methods for tracking and analysing traffic congestion, including the use of video monitoring and surveillance systems, static and dynamic sensors, and real-time traffic management systems (Petrovska & Stevanovic, 2015).

According to Andreula and Thompson (2017) and Arab News (2017), the Google Maps application has had a significant impact on the digital economy. It has transformed personal navigation and brought about changes in various sectors. It has improved efficiency in transportation and logistics by providing accurate mapping data and real-time traffic updates. Local businesses have benefited from increased visibility and foot traffic through Google Maps, while e-commerce platforms have enhanced customer experiences and order accuracy. The integration of Google Maps has also led to the development of innovative location-based applications. Overall, Google Maps has revolutionised navigation, boosted businesses, and stimulated innovation in the digital economy. Recognising the substantial impact of the Google Maps application on the digital economy, there is a pressing need to conduct a comprehensive study to examine its effects. Surprisingly, there is a lack of studies that delve into the specific impact of the Google Maps application on the digital economy. Consequently, this study aims to bridge this gap by focusing on elucidating the influence of the Google Maps application on Thailand's digital economy. By exploring the ramifications of Google Maps across various sectors and industries, this study employed a qualitative approach, seeking to provide valuable insights into its implications for businesses, consumers, and the overall digital ecosystem. The findings of this research endeavour can be of great significance to managers, administrators, business owners, policymakers, and other stakeholders, as it will foster a deeper understanding of the transformative potential of the Google Maps application and its substantial contribution to the digital economy.

The paper is structured into six sections. The initial part serves as an introduction, emphasising the significance of the study and outlining its objectives. Subsequently, Section 2 conducts an extensive examination of the existing literature. Section 3 clarifies the research methodology employed for gathering relevant data. Moving on, Section 4 presents the study's findings and results. Section 5 undertakes a comprehensive discussion, by analysing and interpreting the results in relation to the research objectives. Lastly, the final Section 6 presents the study's conclusions, acknowledges any limitations encountered during the research process, and provides suggestions for future investigations.

2. LITERATURE REVIEW

The literature review section delved into various aspects related to the Google Map Application, including network availability, technological skills, perceived effectiveness, and the implications of Google Map usage for the digital economy.

2.1. Google Maps application

Launched in 2005, Google Maps has revolutionised online mapping service applications on the Internet. A new class of web applications based on Asynchronous JavaScript and XML (AJAX). Google Maps introduced client/server interaction to sustain a constant connection between the client and the server for immediate downloading of additional map data (Peterson, 2008). Google Maps is widely used as a platform for various applications because it provides public satellite maps of the entire globe. However, it is difficult for users to add interactive applications that are visually rich to a website that is based on Google Maps. The reason is that Google Maps cannot provide many Application programming interface (API) features while allowing applications to combine their content. This paper describes a flexible instant messaging system that enables instantaneous interaction with Google Maps and the dynamic presentation of application content. In addition, a travel application is implemented and embedded within a microblogging system, including the server and client components. The application demonstrates that our framework can display dynamic map content and is superior to the JavaScript-based application that interacts with Google Maps (Cao et al., 2010; Vandeviver, 2014). Digital platforms like Google Maps are increasingly mediating experiences within cities; as a result, it has become crucial to develop critical frameworks for understanding the spatial relationships that these platforms reinforce and produce. Google adds location-based data in the form of evaluations and rankings to Google Maps using "local" knowledge gleaned from its Local Guides platform. Google claims to support the local community by identifying review practices and patterns that target and harass employees via the platform. The argument is that the reviews disclose who and what belongs to the platform's construction of

"the local" while simultaneously highlighting what it constructs as not belonging (Bhandari & Noone, 2023; Hawkins, 2023).

2.2. Network availability

Vehicle sensor networks (VSN) are emerging as a novel monitoring tool for the physical world, particularly in urban areas where a high concentration of vehicles with onboard sensors is anticipated. A vehicle tracking system combines the installation of an electronic device in a vehicle or fleet of vehicles with purpose-designed computer software in at least one operational base to enable the owner or a third party to track the location of the vehicle, collecting data from the field and transmitting it to the operational base (Garude & Haldikar, 2014). Globally, mobile communication systems are now an integral part of daily life. Fourth-generation "long-term evolution" (LTE) mobile communication networks are being deployed. The LTE suite of specifications is regarded as vastly superior to its predecessors, not only in terms of functionality, but also in terms of subscriber security and privacy. Using commercial LTE mobile devices in actual LTE networks, these vulnerabilities are exploited through low-cost and practical attacks (Shaik et al., 2015). Thus, the Google Maps mobile application is related to network availability.

2.3. Technological skills and perceived effectiveness

According to Google Maps user feedback, iPhones performed significantly worse than Android devices, regardless of accuracy standards. In addition, logit models were estimated to evaluate the factors influencing the detection of activity given different spatiotemporal accuracy thresholds. In terms of effect magnitudes, floor area ratio (FAR) at the location, activity duration, Android device ratio, device model ratio, whether the destination was an open space or not, and group size were found to have non-trivial effects on activity detection probability (Parady et al., 2023). Most Google Maps users had favourable perceptions regarding the use of Google Maps in the classroom. In their Earth science courses, they have utilised this online geospatial tool with significance. However, students also identified obstacles such as sluggish Internet connections and limited exposure and practice. Future researchers may investigate the use of Google Maps in additional courses or learning competencies, broader school coverage, and the incorporation of other geotechnologies into the teaching of Earth sciences (Landicho, 2020). Thus, technological skills and perceived effectiveness are essential for the Google Maps mobile application.

2.4. Google Maps usage and its implications for the digital economy

Google developed Google Maps, a widely used mapping and navigation tool. It can have a significant impact on Thailand's digital economy in a variety of ways, such as business visibility and discovery, customer engagement, enhanced local search, traffic congestion analysis, mobile commerce and local recommendations, as well as tourism and travel.

Business visibility and discovery's requirement of being able to share information on a need-to-know basis, e.g., within the specific chain of custody of an individual object, poses a particular challenge for authorisation and access control, because, in many supply chain situations, the information owner may not have sufficient knowledge about all the companies who should be authorised to view the information. It is so that the information owner may not be aware of the route that a particular physicist took through the supply chain (Pardal et al., 2012). Business visibility refers to the degree to which a company's products, services, and brand are visible to prospective clients and customers. Using ChatGPT, businesses can increase their visibility by integrating the language model into their strategies for consumer engagement. ChatGPT can attract attention, generate interest, and raise brand awareness by providing a conversational experience that is interactive and personalised. Business discovery, on the other hand, refers to the process of customers locating and discovering a business (Medjahed et al., 2003). Thus, ChatGPT can facilitate business discovery by integrating with multiple channels, including websites, social media platforms, and messaging applications. Customers can easily initiate conversations with the AI-powered assistant to inquire about products, services, and assistance. ChatGPT can assist customers in locating pertinent offerings and navigating the company's offerings through the use of intelligent responses and customised recommendations.

In today's extremely dynamic and interactive business environment, business practitioners and academics are paying increasing attention to the role of "customer engagement" in co-creating customer experience and value. Despite this interest, systematic scholarly investigation into the concept and its conceptual distinction from other related relational concepts has been limited to date (Brodie et al., 2011). Customer engagement includes many behaviours, such as word-of-mouth (WOM) activity, recommendations, assisting other customers, blogging, composing reviews, and even legal action (Van Doorn et al., 2010; Napawut et al., 2022). Thus, Google Maps provides useful information, personalised recommendations, and a smooth navigation experience to engage customers. Users can explore Google Maps reviews, images, and experiences. Google Maps incorporates user comments and preferences to improve its services and enhance the user experience. Google Maps aims to retain its top status as a mapping and navigation platform by encouraging client interaction.

The vehicle routing problem (VRP) is the issue of designing the route for distributing goods from one depot to some customers to minimise costs, ensure that each customer is only visited once, that all routes begin and end at the depot, and that the total demand of all customers on the route does not exceed vehicle capacity. The capacitated VRP and the multiple trip VRP are two variants (Wahyuningsih & Satyananda, 2017). Thus, Google Maps' Enhanced Local Search helps consumers find local businesses and services. Google Maps provides reliable and up-to-date information on nearby restaurants, shopping, and attractions using location-based data, user reviews, and ratings. This tool helps users explore their local area, identify services, and make informed decisions. Google Maps

remains essential for navigation and community engagement thanks to Enhanced Local Search.

To encourage the growth of traffic video analysis, a novel perspective on congestion is presented. Our three principal contributions are: 1) a standardised and quantifiable definition of congestion is proposed to characterise the video traffic state; 2) as a platform for the research community, a congestion dataset containing multiple traffic scenes is compiled based on the definition. Simultaneously, a precise labelling method is implemented to accurately determine the level of congestion on the ground; 3) a baseline algorithm for analysing traffic videos based on inverse perspective mapping (IPM) and pairwise regression is proposed. We compare the proposed method to two other deep learning approaches. Extensive tests demonstrate the efficacy of the proposed method (Wang et al., 2009; Petrovska, 2015; Wan et al., 2017). Thus, Google Maps' Traffic Congestion Analysis analyses real-time data to provide traffic insights. Google Maps uses Global Positioning System (GPS) signals and user reports to assess congestion, indicate heavy traffic, and propose alternative routes. This analysis helps users make smart choices, save time, and avoid traffic. Google Maps improves navigation and trip efficiency by continuously monitoring and analysing traffic patterns.

The e-commerce market is growing daily. In this context, m-commerce has become one of the fastest-expanding types of e-commerce worldwide. In light of the variety of platforms and devices, it is essential to comprehend the factors that influence the intent to continue utilising e-commerce access platforms. The participants were divided into three access platforms, one using traditional e-commerce (via notebooks or PCs) and the other using m-commerce (accessing the website browser or the app). In contrast to those who use web browsers, consumers who use mobile applications are primarily motivated by utilitarian rather than hedonic factors (Lucas et al., 2023). Thus, Google Maps' mobile commerce and local recommendations increase shopping. Mobile commerce integration makes it easy to shop on the go at Google Maps companies. Google Maps also suggests nearby companies based on user choices, reviews, and geographic data. Google Maps allows users to make educated purchases and support local businesses by integrating mobile commerce with personalised local suggestions.

The selection of tourist attractions and gathering relevant site information are two of the most important activities for a tourist when planning a trip. Although numerous recommendation systems have been discussed over the past decade, these systems rarely consider individual tourists' preferences. The probability of a tourist attraction being attractive to a particular tourist is calculated using the internet network. The tourist attractions are displayed via an interactive Google Maps user interface (Hsu et al., 2012). With the advent of GPS and interactive map applications, the travel and tourism industries have significantly accelerated. In addition, cloud services such as "Google Maps" are advantageous for individual travellers. However, there are still limitations, such as travel destination categorisation and location-based user travel recommendations. Important is the interactive trip planning service with enhanced travel information

services and travel suggestions. This system can assign a positive or negative score to a given travel itinerary by analysing meteorological conditions and distances. Even if the user does not know the optimal route to reach his or her intended travel destinations, the user can initially input the starting location and desired travel destinations. The system can analyse user inputs, generate the shortest path between all travel destinations, and generate a travel plan with the route. The user can then access meteorological information for all locations, including conditions, temperature, wind speed, and humidity. The system then recommends the suitability of the travel at the specified time (Rathnayake, 2018).

3. RESEARCH METHODOLOGY

The research strategy utilised in this study involved employing a qualitative research approach. The qualitative research method is divided into four steps: 1) research design, 2) data collection, 3) data analysis, and 4) report writing (Moin & Kraiwanit, 2023). This methodology focuses on investigating the circumstances in which individuals or groups make decisions and demonstrate specific behaviours, while also aiming to explain the observed phenomena. This approach enables the collection of supplementary data and the attainment of a comprehensive understanding and emphasises the significance of open communication during interviews (Siripipatthanakul et al., 2022). This study centres on qualitative interviews, which are frequently combined with other qualitative or quantitative methods (e.g., participant observation, surveys, or experiments) and are the most frequently used method in qualitative research using semi-structured interview questions (Burton et al., 2023; Dunwoodie et al., 2023). This article examines the merits of employing a qualitative interview methodology in empirical business and digital economy research, as well as the difficulties associated with disseminating such findings.

A series of in-depth interviews were conducted to assess the impact of the Google Maps application on the digital economy. Purposive sampling was used to select participants for the study. Following the recommendation in qualitative research to achieve data saturation, a minimum sample size of six participants was sought (Jangjarat et al., 2023).

The alternative qualitative approach is focus group discussions. Online focus group research incorporates modified moderation, reduced sample sizes, adaptability in interviewing tools and channels, and novel ethical considerations specific to the online environment throughout the interview planning, execution, and analysis processes. The normalisation of hybrid methods promotes the complementarity of in-person and online focus groups as two modalities of data collection (Bolin et al., 2023). The researchers adhered to the standardised criteria for reporting qualitative research. However, the research objectives served as the guiding principles for the general inductive approach to data analysis in this qualitative study using one-by-one interviews, not focus group discussions, due to the convenience of the respondents.

Thus, a total of 12 individuals were interviewed by purposive sampling, including six Google Maps users and six business owners. The respondents

were three male Google Maps users, three male business owners, three female Google Maps users, and three female business owners. The age range was between 22 and 49 years old. These participants were specifically chosen to meet certain criteria: 1) they needed to be at least 18 years old, 2) employed or involved in managerial positions, or have a stake in Google Maps activities in Bangkok, Thailand. Additionally, they were required to possess recent knowledge and experience using Google Maps. The interview data was collected in March 2023.

For data analysis, content analysis is a qualitative method used to systematically and objectively describe particular phenomena by drawing valid inferences from verbal, visual, or written data. Qualitative content analysis involves systematically condensing data into categories or themes. This process relies on the researcher's ability to make valid inferences and employs inductive reasoning. Through diligent examination and continuous data comparison, the researcher derives themes and categories directly from the data

(Mezmir, 2020; Vespestad & Clancy, 2021). In addition, NVivo is a valuable tool that enables researchers to achieve depth and breadth in their analysis. It holds a significant position as software in qualitative data analysis, offering researchers and analysts a wide range of tools to effectively manage, organise, and analyse qualitative data (Mortelmans, 2019; Olapane, 2021). Therefore, content analysis and NVivo were used to analyse the data.

4. RESULTS

A total of twelve key informants were interviewed. Table 1 presents the participants' demographic details, including their gender, age, role, and the date and time of their interviews. The sample consisted of six Google Maps users (three males and three females) aged between 22 and 39 years old and six business owners (three males and three females) aged between 32 and 49 years old. All individuals involved in the study were based in Bangkok, Thailand.

Table 1. Demographic information on the respondents and interview dates and times

No.	Gender	Age	Role	Date and time of interview
R1	Male	28	Google Maps' user	March 12, 2023 at 09:30 am
R2	Male	29	Google Maps' user	March 12, 2023 at 10:30 am
R3	Male	39	Google Maps' user	March 13, 2023 at 09:00 am
R4	Female	27	Google Maps' user	March 13, 2023 at 10:00 am
R5	Female	22	Google Maps' user	March 14, 2023 at 09:00 am
R6	Female	23	Google Maps' user	March 14, 2023 at 10:00 am
R7	Male	32	Business owner	March 15, 2023 at 10:00 am
R8	Male	38	Business owner	March 15, 2023 at 11:00 am
R9	Male	49	Business owner	March 16, 2023 at 10:00 am
R10	Female	36	Business owner	March 16, 2023 at 11:00 am
R11	Female	42	Business owner	March 17, 2023 at 10:00 am
R12	Female	33	Business owner	March 17, 2023 at 11:00 am

By analysing the participants' responses, the study revealed several key themes regarding the influence of the Google Maps application on Thailand's digital economy. These themes included: 1) business visibility and discovery, 2) customer engagement, 3) improved local search, 4) traffic congestion analysis, 5) mobile commerce and local recommendations, and 6) tourism and travel. The participants all agreed that Google Maps played

a significant role. The interview data was analysed using content analysis and the NVivo software to examine the collected information comprehensively. A word frequency query was conducted, and the most frequently used words during the interviews were visually represented in a word cloud to enhance the understanding of the findings (Figure 1).

Figure 1. Word cloud

Source: Authors' elaboration using NVivo.

4.1. Factors affecting users' experiences: Network availability, technological skills and perceived effectiveness

Google Maps relies on network availability to provide accurate maps, real-time traffic updates, directions, search results, and visual information. The app's usefulness and up-to-date information would be unlimited with a network connection. It utilises a vast database of locations and requires network connectivity to access the latest map updates. Real-time traffic information depends on network availability to incorporate traffic conditions and provide precise statistics. Navigation and turn-by-turn directions rely on a network connection to calculate optimal routes and offer voice-guided guidance. Users need network connectivity to access search results, reviews, ratings, and nearby location information. Street View and satellite imagery also require a network connection for real-time retrieval.

"Google Maps has become an integral part of our daily lives, and its functionality is greatly enhanced with a reliable network connection" (R1).

"Google Maps is a powerful tool that relies on real-time information to provide accurate and up-to-date maps, traffic updates, directions, and various other features" (R2).

"If users feel that Google Maps is providing them with the most optimal routes, reliable real-time traffic information, and helpful search results, they'll likely view it as an effective tool. On the other hand, if they encounter inaccuracies or experience difficulties with the app, their perception of its effectiveness may be negatively impacted" (R3).

"Users' experiences with Google Maps can be influenced by their perception of how well the app meets their needs. If they find the app accurate, reliable, and easy to use, they're more likely to have a positive experience" (R4).

"While Google Maps is user-friendly, some people may have varying levels of proficiency when it comes to using smartphone apps or navigation tools. Those with more technological skills might find it easier to navigate and use the features effectively" (R5).

4.2. Google Maps and its effect on the digital economy in Thailand

4.2.1. Business visibility and discovery

Google Maps increases the online visibility of businesses by enabling them to establish a presence on the platform. Local businesses, such as restaurants, hotels, and retail stores, can display their location, contact information, reviews, and hours of operation. Facilitates prospective customers' discovery of these businesses, increasing foot traffic and potential sales.

"Google Maps allows local businesses like restaurants, hotels, and retail stores to establish a presence on the platform. They can create a profile that includes their location, contact information, hours of operation, and even customer reviews" (R6).

"By being on Google Maps, businesses can reach a wider audience and make it easier for potential customers to find them. When people search for a specific business type or explore an area on Google Maps, they'll come across these local businesses. It helps businesses get discovered and can drive more foot traffic to their physical locations" (R7).

"That's really valuable, especially for smaller businesses that might not have a strong online presence. Google Maps can level the playing field and help them compete with larger establishments. It provides a platform for businesses to showcase their offerings and attract potential customers who are actively searching for relevant services or products" (R8).

"When people find businesses on Google Maps, they can also get directions, see photos of the place, and even check the street view. It provides a rich and interactive experience for users. Google Maps has become an essential tool for businesses to connect with customers and increase their chances of driving more foot traffic and potential sales" (R11).

4.2.2. Customer engagement

Google Maps provides customer-engaging features like reviews, ratings, and photographs. Users can give feedback regarding their business interactions, influencing others purchasing decisions. Positive reviews and high ratings can increase a business's revenue and reputation by attracting more consumers.

"The reviews and ratings on Google Maps play a crucial role. The reviews and ratings from customers can have a significant impact on a business's reputation and credibility. Positive reviews can attract more customers, while negative reviews can potentially deter them. So, it's important for businesses to provide excellent service and encourage happy customers to leave positive reviews" (R9).

"Google Maps provides customer-engaging features like reviews and ratings for businesses. It's great that users can share their experiences and provide feedback on the businesses they've interacted with" (R10).

"The reviews and ratings play a significant role in influencing others' purchasing decisions. When people see positive reviews and high ratings, they are more likely to trust and choose that business. It's like word-of-mouth recommendations in the digital age. Positive reviews can create a sense of credibility and reliability, which can attract more customers" (R11).

"Businesses with a strong presence on Google Maps, backed by positive reviews, have the potential to increase their revenue and reputation. It becomes a powerful marketing tool that can drive more consumers towards them" (R12).

4.2.3. Enhanced local search

Google Maps is integrated with Google Search, allowing consumers to search for local businesses and services. For instance, if a user searches for "Thai restaurants near me" on Google, the search results are frequently displayed within Google Maps. This integration improves local search capabilities and makes it simpler for users to locate relevant businesses nearby. Google Maps usage can increase consumer traffic and revenue for businesses that appear in search results.

"Google Maps is integrated with Google Search. It makes it so much easier to find local businesses and services. Well, when you search for something like

'Thai restaurants near me' on Google, the search results often show up within Google Maps. It's a seamless integration that enhances local search capabilities" (R2).

"It's convenient! So, instead of just getting a list of search results, you can see them directly on the map. The search results are displayed as markers on the map, making it easier for users to locate relevant businesses nearby. You can see their names, ratings, and even access their Google Maps profiles for more information" (R6).

"When businesses appear in search results on Google Maps, it increases their visibility and the chances of attracting consumer traffic. It drives more customers to businesses that are listed in those search results. Google Maps has become a go-to platform for consumers looking for local businesses, and this integration with Google Search amplifies its reach and impact" (R7).

4.2.4. Traffic congestion

Google Maps provides precise directions and real-time traffic data, enabling users to navigate to physical locations efficiently. Google Maps allows users to efficiently plan their voyages by giving turn-by-turn directions, estimated travel times, and alternate routes. It is especially beneficial for businesses that rely on foot traffic or consumers visiting physical stores, as it increases the likelihood that users will choose their location over competitors' applications.

"Using Google Maps for navigation is incredibly helpful in providing precise directions and real-time traffic data. Google Maps makes it easy to plan your trips efficiently. You can enter your destination, and it will give you the most optimal route, taking into account traffic conditions" (R2).

"What's great is that it also offers alternate routes, so if there's an accident or heavy traffic on your original route, you can quickly find an alternative path. It's saved me from getting stuck in traffic jams on multiple occasions" (R5).

"Businesses that rely on foot traffic or customers visiting their physical stores can benefit greatly from Google Maps. When users search for a specific type of business or service on Google Maps, it displays a list of options. Businesses listed on Google Maps have a higher likelihood of attracting customers because they are easily discoverable and their location is displayed prominently" (R9).

4.2.5. Mobile commerce and local recommendations

The widespread use of smartphones and the incorporation of Google Maps on mobile devices have facilitated mobile commerce. The Google Maps application makes it simple for users to locate businesses, make reservations, or place orders. In addition, Google Maps suggests adjacent businesses that may be of interest based on the user's location and preferences. Google Maps usage encourages users to investigate new businesses and stimulates local spending.

"Google Maps has made it so convenient to engage in mobile commerce. With the widespread use of smartphones, Google Maps has become a go-to app for locating businesses and making transactions on the go. You can easily find nearby businesses, make

restaurant reservations, or even place orders for pickup or delivery, all within the Google Maps app" (R8).

"It's incredibly convenient, especially when you're exploring a new area or looking for specific services nearby. Google Maps helps you find what you need with just a few taps. Not only that, Google Maps goes a step further by suggesting adjacent businesses that might be of interest based on your location and preferences. It's like having personalised recommendations right at your fingertips" (R9).

"Google Maps encourages users to explore new businesses and discover new experiences that they might not have considered otherwise. This, in turn, stimulates local spending and supports the growth of local businesses. When users are encouraged to investigate and try out new places, it creates a positive impact on the local economy" (R12).

4.2.6. Tourism and travel

Thailand is a popular tourist destination, and Google Maps is significant in assisting tourists with navigation. It contains comprehensive maps, points of interest, and suggestions for attractions, lodging, and dining. Google Maps usage improves the entire travel experience and contributes to the expansion of Thailand's tourism industry.

"Google Maps is a lifesaver when it comes to exploring Thailand. It provides comprehensive maps and helps us find attractions, lodging, and dining options. With Google Maps, users can easily discover points of interest, whether it's historical sites, natural wonders, or cultural attractions. It's like having a virtual tour guide in your pocket" (R1).

"Google Maps helps tourists plan their itineraries, find the best routes, and optimise their time spent exploring Thailand's many attractions. Moreover, the suggestions for lodging and dining are invaluable. With a quick search, you can find nearby hotels, resorts, and restaurants, making it easier to find accommodation and enjoy local cuisine" (R3).

"The convenience and reliability of Google Maps enhance the entire travel experience in Thailand. It's no wonder that it has become an essential tool for tourists. The availability and usage of Google Maps contribute to the growth and expansion of Thailand's tourism industry. It helps attract more tourists and ensures they have a positive experience exploring the country" (R4).

5. DISCUSSION

According to Cao et al. (2010), Brodie et al. (2011), Vandeviver (2014), Garude and Haldikar (2014), Shaik et al. (2016), Parady et al. (2023), Van Doorn et al. (2010), Mehta et al. (2019), Wallis (2022), Napawut et al. (2022), and Wahyuningsih and Satyananda (2017), this study's results support these previous studies that factors influencing Google Maps usage include network availability, technological skills, and perceived effectiveness. Whereas the implications of Google Maps usage on the digital economy in Thailand are 1) business visibility and discovery, 2) customer engagement, 3) enhanced local search, 4) traffic congestion, 5) mobile commerce and local recommendations, and 6) tourism and travel.

5.1. Network availability, technological skills and perceived effectiveness: Users' experience

This study supports Shaik et al. (2016) and Garude and Haldikar (2014), that mobile communication and networking availability have become a daily necessity worldwide. Fourth-generation "long term evolution" (LTE) mobile networks are installed. LTE specs outperform its predecessors in functionality, subscriber security, and privacy. Using commercial LTE mobile devices in real LTE networks, low-cost and practical attacks exploit these vulnerabilities.

The findings also support Parady et al. (2023) and Landicho (2020) that most Google Maps users liked using mobile in class. They used this important online GIS tool in Earth science classes. The challenges included slow Internet connections and limited exposure and practice. Future researchers may study using Google Maps in more courses or learning competencies, larger school coverage, and other geotechnologies in Earth science education. Thus, the Google Maps mobile app requires technological expertise and perceived effectiveness.

The findings also support Pardal et al. (2012) and Medjahed et al. (2003) that Google Maps are essential for the digital economy. Google created Google Maps, a popular navigation tool. It can boost business exposure and discovery, consumer interaction, local search, traffic congestion analysis, mobile commerce, local recommendations, tourism, and travel in Thailand's digital economy.

In many supply chain situations, the information owner may not know all the companies that should be authorised to view the information, making authorisation and access control difficult. Business visibility and discovery requires people to share information on a need-to-know basis, such as within an object's chain of custody. The information owner may not know a physicist's supply chain route. Business visibility measures how visible a company's products, services, and brand are to potential customers. Businesses can boost visibility by incorporating ChatGPT's language model into consumer engagement tactics. Interactive and customised conversations using ChatGPT can increase brand exposure, interest, and attention. However, business discovery involves customers finding and discovering a business.

Google Maps provides accurate maps, real-time traffic updates, directions, search results, and visual information using network availability. The app's usefulness and current information would be significantly limited without a network connection. Google Maps employs a massive database of highways, landmarks, and other locations. Google Maps needs a network connection to get current and accurate maps from Google's servers. The application can access the latest map updates with network connectivity, resulting in obsolete and insufficient data. Google Maps real-time traffic information is a key feature. This feature helps technical route planners incorporate traffic, accidents, road closures, and other issues. Real-time traffic data requires network connectivity on Google Maps. The application can offer precise traffic statistics over a network connection, preventing unexpected delays and impediments.

Google Maps offers navigation and turn-by-turn directions. Google Maps relies on network connectivity to compute the best route, provide voice-guided navigation, and update real-time directions based on traffic. The app might provide precise coordinates for optimal navigation with a network connection. Google Maps lets users find restaurants, gas stations, hotels, and more. Google's enormous database and current events inform these search results. Users need network connectivity to obtain the latest search results, reviews, ratings, and nearby location information. Users can get the latest location information with a network connection. Google Maps Street View lets users explore streets from ground level. Users can also view locations via satellite imaging. Street View and satellite imagery require a network connection for real-time retrieval and storage. Users could access these visual features with network connectivity, restricting their exploration and understanding of their environment.

5.2. The implications of Google Maps on the digital economy in Thailand

Google Maps is crucial in various aspects of business and consumer engagement, including business visibility and discovery, customer engagement, enhanced local search, traffic congestion, mobile commerce, local recommendations, and tourism and travel. It enhances business visibility by allowing local establishments to showcase their information and attract potential customers. Customer engagement is increased through features like reviews and ratings, which influence purchasing decisions. Integration with Google Search enhances local search capabilities, making it easier for users to find relevant businesses nearby. The real-time traffic data and navigation features help users efficiently reach physical locations, benefiting businesses that rely on foot traffic. Google Maps lets users find businesses, book reservations, and place orders via mobile devices. Local recommendations based on user preferences encourage exploration and stimulate local spending. For tourists, Google Maps provides comprehensive maps, points of interest, and travel suggestions, contributing to the growth of the tourism industry.

The Google Maps application makes it simple for users to locate businesses, make reservations, or place orders. In addition, Google Maps suggests adjacent businesses that may be of interest based on the user's location and preferences. It encourages users to investigate new businesses and stimulates local spending through mobile commerce and local recommendations. Thailand is a popular tourist destination, and Google Maps is essential in assisting tourists with navigation throughout the country. It contains comprehensive maps, points of interest, and suggestions for attractions, lodging, and dining. It improves the entire travel experience and contributes to the expansion of Thailand's tourism industry. Google Maps has a considerable effect on the digital economy of Thai users. It aids businesses in increasing their visibility, interacting with consumers, and driving foot traffic to their physical locations. In addition, it facilitates mobile commerce, offers local recommendations, and assists the tourism industry. Google Maps

contributes to economic growth, increased sales, and improved user experiences in the digital domain by connecting users with relevant businesses and enabling efficient navigation. Therefore, the development of the Google Maps application depends on feedback from users and business owners because it is crucial for its implications for the digital economy.

6. CONCLUSION

This study illuminated the impact of the Google Maps application on Thailand's digital economy. Google Maps, a widely used navigation and mapping application, has the potential to impact Thailand's digital economy in several ways significantly. One key aspect is business visibility and discovery. By establishing a presence on Google Maps, local businesses such as restaurants, hotels, and retail stores can enhance their online visibility by showcasing their location, contact details, reviews, and operating hours. It enables prospective customers to easily discover and engage with these businesses, leading to increased foot traffic and potential sales. Furthermore, Google Maps offers consumer engagement features like reviews, ratings, and photos. Users can provide feedback about their experiences with businesses, influencing purchasing decisions. Positive reviews and high ratings can boost a business's revenue and reputation, attracting more consumers. Integration with Google Search further enhances the local search capabilities of Google Maps. When users search for specific businesses or services in particular locations, the search results often appear within Google Maps. This integration simplifies locating relevant businesses nearby, increasing consumer traffic and revenue for those that appear in the search results. Moreover, Google Maps provides accurate directions and real-time traffic information, enabling users to navigate to physical locations quickly and efficiently. It offers turn-by-turn directions, estimated travel times, and alternate routes, making it easier for users to plan their journeys. This feature is especially advantageous for businesses reliant on foot traffic or physical store visits, as it increases the likelihood of users choosing their location over competitors'. In addition, the widespread adoption of smartphones, coupled with the integration of Google Maps on mobile devices, has also facilitated mobile commerce. Users can efficiently access Google Maps on their smartphones, further supporting the growth of digital transactions. In conclusion, Google Maps' impact on Thailand's digital economy is substantial. Its features for business visibility, consumer engagement, local search integration, accurate directions, and mobile commerce have transformed the way businesses and consumers interact, contributing to economic growth and development.

Despite the positive impact of Google Maps on Thailand's digital economy and tourism industry, there are certain limitations that should be considered for future studies. Firstly, this study relied on a small sample size of six Google Maps consumers and six business owners, which may limit the generalizability of the findings. To overcome this limitation, future research could adopt a larger sample size due to the small sample size in this qualitative research for 12 interviews. It may need to have a better representation of the population. Also, employ quantitative methods to gather data from a more diverse range of participants. Secondly, the study focused primarily on the perspectives of users and business owners, neglecting the views of other stakeholders such as government officials, local communities, and industry experts. It would be beneficial for future studies to incorporate a more comprehensive range of perspectives to gain a holistic understanding of the impact of Google Maps on Thailand's digital economy and tourism sector. Additionally, the current research utilised content analysis and NVivo to analyse the data. While these methods provide valuable insights, they are limited in their ability to capture nuanced and contextual information. Future studies could consider employing mixed-method approaches that combine qualitative and quantitative data analysis techniques to gain a deeper understanding of the various dimensions and factors influencing the impact of Google Maps on the digital economy. Moreover, the study focused solely on the benefits and impact of Google Maps in Thailand. It would be interesting for future research to compare and contrast the findings with other countries or regions to identify potential cultural or contextual variations. Lastly, this study highlighted the positive aspects of Google Maps on the digital economy, but it is also important to explore any potential negative consequences. Future research could investigate potential privacy concerns, data security issues, or the impact of Google Maps on small local businesses that may struggle to compete with larger establishments.

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APPENDIX

The questions used in the interviews are listed below.

Table A.1. Questions for interviewers

No.	Question
1	How important is network availability for your experience when using Google Maps? Can you describe any instances where network availability significantly impacted your use of the app?
2	In your opinion, how crucial is real-time information for Google Maps to be effective? Can you provide an example of when real-time data in Google Maps positively or negatively affected your experience?
3	How do you perceive the effectiveness of Google Maps in providing optimal routes, reliable traffic information, and helpful search results? Have you encountered any inaccuracies or difficulties that affected your perception?
4	Can you describe your experience using Google Maps in terms of its accuracy, reliability, and user-friendliness? How do these factors contribute to your overall experience with the app?
5	Do you have any technological skills that you think make it easier for you to use Google Maps effectively? How do you think users with varying levels of technological skills experience the app differently?
6	How has the presence of local businesses on Google Maps influenced your decision to visit or interact with them? Have you discovered new businesses through the platform?
7	In what ways has Google Maps helped you discover local businesses or services that you might not have found through other means? Can you share an example of a successful discovery or interaction facilitated by Google Maps?
8	How do you think Google Maps levels the playing field for smaller businesses that may not have a strong online presence? Have you had any experiences where a smaller local business gained your attention through Google Maps?
9	How much do customer reviews and ratings on Google Maps influence your decisions when choosing a business or service? Can you recall a time when reviews or ratings played a significant role in your decision-making process?
10	Have you used Google Maps to search for local businesses or services? How does the integration of Google Maps with Google Search affect your experience when searching for specific types of businesses?
11	Can you describe how businesses with a strong presence on Google Maps, backed by positive reviews, may benefit in terms of revenue and reputation? Have you been influenced by a business's presence and reputation on the platform?
12	In what ways has Google Maps influenced your engagement in mobile commerce, such as making reservations or placing orders? Can you share an experience where Google Maps made a transaction or interaction more convenient for you?
13	Have you noticed Google Maps suggesting adjacent businesses based on your location and preferences? How do these personalised recommendations impact your decision-making when exploring new places or services?
14	How has Google Maps influenced your experiences as a tourist or traveller in Thailand? Can you share instances where Google Maps enhanced your travel experience, such as finding attractions, lodging, or dining options?
15	In your opinion, how does the availability and usage of Google Maps contribute to the growth and expansion of Thailand's tourism industry? Can you discuss the impact of Google Maps on attracting more tourists and ensuring a positive travel experience?

In the context of the survey, it is important to note that not all questions are posed to each participant. Selective omission of certain inquiries is undertaken to ensure their relevance to specific respondents.